FINANCING BUILDING ENERGY PERFORMANCE IMPROVEMENT IN POLAND

STATUS REPORT

BPIE

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SECTION 1 - Energy Performance of the Polish Building Stock and Characteristics of the Renovation Market

1 Building stock data

According to data from the Central Statistical Office, in 2011 the total number of buildings in Poland now exceeds 6 million. A breakdown according to location (urban/rural) and type is provided in Table 1.

Table 1 – Breakdown of Polish residential building stock in 2011 (Source: Statistical yearbook of the Republic of Poland (2013). Zamieszkane Budynki, Narodowy Spis Powszechny Ludności i Mieszkań 2011)

		Total	Including						
			Inhabited	of which					Uninhabited
				Residential	of which		Collective accommodation	Non-residential	
					Single-family	Multi-family			
Total	thousands	6,047.1	5,567.6	5,542.6	5,007.5	535.1	3.3	21.0	479.5
Urban areas		2,285.6	2,189.2	2,176.4	1,738.2	438.2	1.8	10.8	96.4
Rural areas		3,761.5	3,378.4	3,366.2	3,269.3	96.9	1.4	10.3	383.1

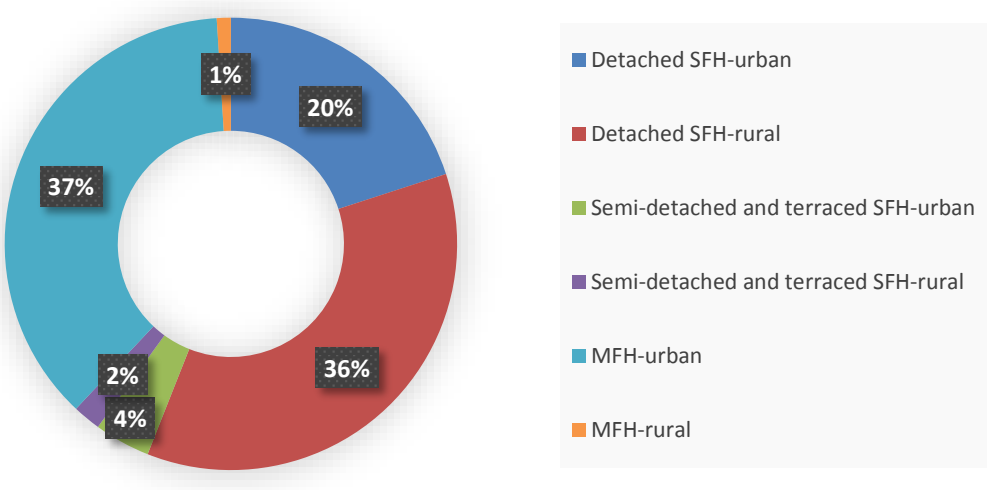
NOTE: Non-residential refers to property other than housing such as offices, retail, industrial, hotels, hospitals and education with at least one apartment.

Table 2 – Estimated breakdown of Polish non-residential building stock in 2010 (Source: Kwalifikacje zawodowe i kadry dla zielonego budownictwa, NAPE, Build Up Skills, 2012)

Non-residential building type	Total in thousands
Warehouse	123.7
Hotels/Restaurants	82.5
Educational facilities	38.9
Cultural facilities	11.4
Health facilities	33.4
Office buildings	18.5
Total	308.4

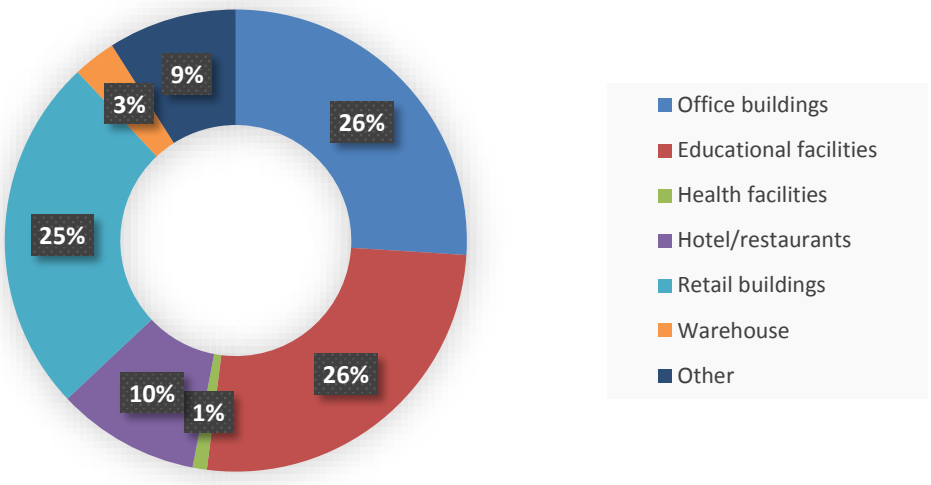
The percentage distribution by type of buildings is presented in Figure 1 and Figure 2. For residential buildings, the largest sectors by surface area are multi-family houses (MFH) in urban areas (37%) and detached single-family houses (SFH) in rural areas (36%).

Figure 1 – Distribution of residential floor area by building type (Source: Implementing Nearly Zero-Energy Buildings (NZEB) In Poland -Towards a Definition and Roadmap, BPIE, 2012)



For non-residential buildings, three-quarters of the total surface area is accounted for by office buildings, educational facilities, and retail buildings, each representing around one-quarter of the total.

Figure 2 – Distribution of non-residential floor area by building type (Source: Implementing Nearly Zero-Energy Buildings (NZEB) In Poland -Towards a Definition and Roadmap, BPIE, 2012)



Another analysis drawn up by the Central Statistical Office shows the age structure of buildings and housing resources in Poland. The vast majority of buildings have a very high level of demand for final energy and thus are key targets for thermo-modernisation.

Table 3 contains information about changes in the level of primary and final energy to the end of 2010.

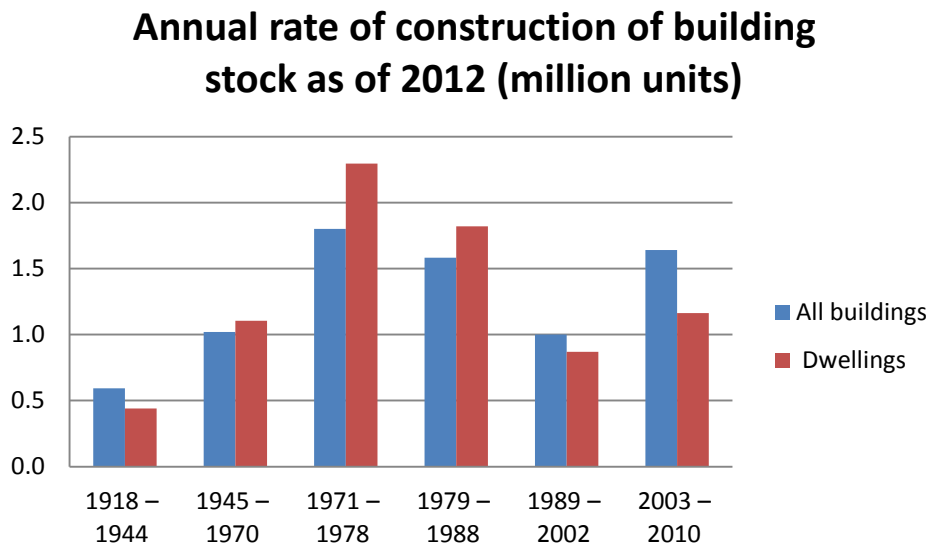
Table 3 – Age structure and energy demand of Polish housing stock in 2010 (Source: S. Mankowski, E. Szczechowiak, Strategic research project entitled "Integrated system for reducing operating energy consumption in buildings" Research Task No. 2 Volume I, Part A: Conditions of transformations in construction)

Year of construction	Buildings		Dwellings		Primary energy*	Final (delivered) energy
	thousands	%	mln.	%	kWh/(m^{2}a)	kWh/(m^{2}a)
before 1918	413.30	7.71	1.21	9.01	> 350	> 300
1918 – 1944	828.20	15.44	1.54	11.46	300 – 350	260 – 300
1945 – 1970	1367.50	25.50	3.71	27.62	250 – 300	220 – 260
1971 – 1978	676.50	12.61	2.16	16.08	210 – 250	190 – 220
1979 – 1988	763.50	14.24	2.20	16.38	160 – 210	140 – 190
1989 – 2002	698.40	13.02	1.52	11.31	140 – 180	125 – 160
2003 – 2010	616.02	11.48	1.09	8.14	100 – 150	90 – 120
All	5,363.42	100.0	13.43	100.0		

* NOTE: The primary energy indicator concerns the index of non-renewable energy in the purpose of heating, ventilation and domestic hot water. The final energy indicator concerns the energy of the demand on the heating and ventilation and domestic hot water.

The graph below shows the rate of construction of buildings that remain in existence as of 2010, illustrating that the period 1971-1988 was the most prolific.

Figure 3 – Annual construction rate



Residential buildings

According to a 2013 report on energy efficiency in Poland, 72% of single-family buildings have a low or very low energy standard[1]. At the same time, 70% of single-family buildings in Poland use coal, amounting to 3.5 million coal-fired boilers (which collectively consume more than 9 million tonnes of coal per year). 28.8% of buildings have boilers that are more than 10 years old. About 3 million of these installations are based on manually fed boilers, an outdated technology which leads to significant air pollution.

Polish energy consumption in households, by energy carrier, differs significantly from other EU countries, notably with the highest per capita coal consumption. The consumption of coal per inhabitant in Poland was ten times higher than the EU-27 average.

The energy consumed in Polish households by energy carrier is presented in Table 4. As noted earlier, the vast majority of installations are based on coal.

Table 4 – Energy consumption in households (Source: Central Statistical Office (2014), Energy consumption in households in 2012)

Energy carrier	**Unit of measure**	**Household consumption**			**National share of energy carrier usage in households**
		original units	PJ	%	
Total			**821.3**	**100.00**	
Electricity	TWh	28	101.9	12.41	19.1
District heat	PJ		180.0	21.92	53.9
Natural gas	PJ		141.4	17.22	22.7
LPG*	thousand t	500	23.7	2.88	20.5
Heating oil	thousand t	87	3.8	0.46	9.6
Hard coal	thousand t	9,200	243.8	29.69	12.2
Lignite	thousand t	450	3.6	0.44	0.7
Coke	thousand t	190	5.3	0.65	6.5
Fuel wood	PJ		116.9	14.23	58.0
Solar energy	PJ		0.4	0.05	69.3
Geothermal energy**	PJ		0.5	0.06	77.1

*Consumption for household purposes only (excluding fuels consumed by cars)
**Households use geothermal energy obtained indirectly from a heating company network

[1] Energy Efficiency in Poland 2013 Review

From an EU perspective, the household share of total energy consumption ranged from 6% (Malta) to 31% (Latvia). The average rate for the 27 EU countries was 16%. Poland, at 19%, is slightly above the average and comparable with the proportion in Ireland, the UK, Austria, Italy and Greece.

The second indicator is the energy consumption per capita in the household sector. Poland, at 21 GJ/inhabitant, is slightly below average compared with other EU countries (Table 5).

Table 5 – Energy consumption in households and the share of households in the total national energy consumption in Poland and in the EU countries in 2011 (Source: Central Statistical Office (2014), Energy consumption in households in 2012)

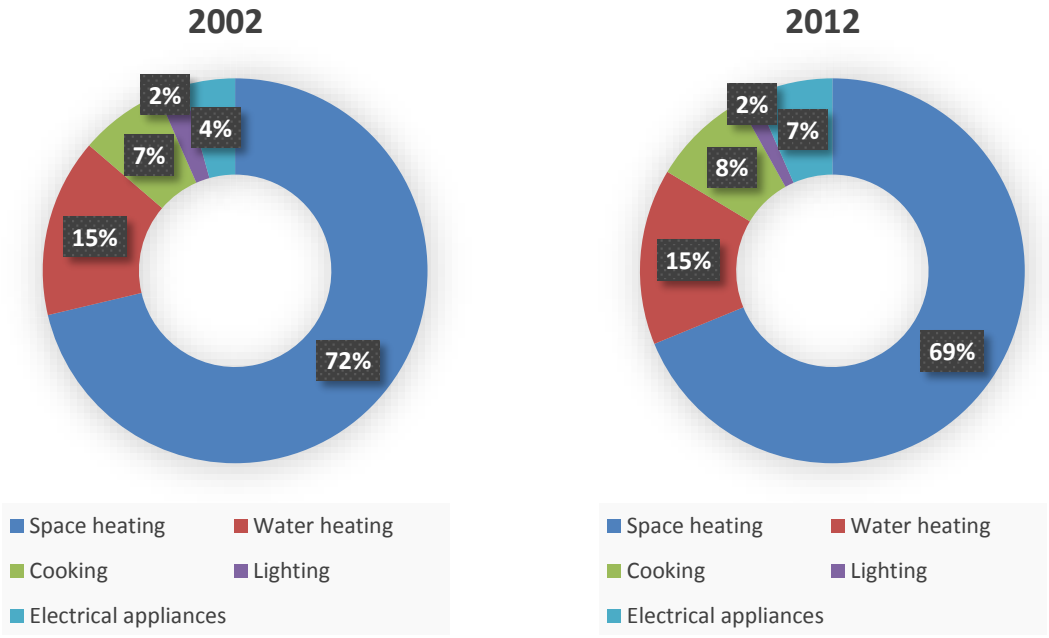
Country	Energy consumption in households		Households in national energy consumption
	TJ	GJ/inhabitant	%
Latvia	55,166	27	31
Denmark	182,957	33	23
Hungary	231,140	23	22
Lithuania	63,950	21	22
Romania	329,067	16	22
Ireland	114,360	25	20
Greece	228,082	21	20
Austria	269,813	32	19
Poland	**795,745**	**21**	**19**
UK	1,500,500	24	18
Italy	1,311,299	22	18
Germany	2,216,246	27	17
Slovenia	49,106	24	16
Estonia	39,203	29	15
Finland	211,224	39	14
Sweden	291,259	31	14
France	1,546,935	24	14
Czech Republic	246,700	23	14
Spain	679,154	15	13
Belgium	310,040	28	12
Netherlands	408,220	24	12
Slovakia	88,814	16	12
Cyprus	12,877	15	12
Bulgaria	99,649	14	12
Portugal	116,659	11	12
Luxembourg	17,867	34	9
Malta	3,051	7	6

Energy in Polish residential buildings is used mainly in order to meet space heating requirements. Total energy use has increased by 3% over the last 10 years (Table 6, Figure 4), largely due to an increase in electrical appliance energy use.

Table 6 – Final energy consumption in households by purpose of use (Source: Energy statistics, estimations of the Energy Market Agency S.A.)

Purpose of use	2002			2009			2012		
	GWh	PJ	%	GWh	PJ	%	GWh	PJ	%
Total	**211,945**	**763**	**100.0**	**217,806**	**784**	**100.0**	**218,333**	**786**	**100.0**
Space heating	151,111	544	71.3	152,889	550	70.2	150,278	541	68.8
Water heating	31,889	115	15.0	31,278	113	14.4	32,222	116	14.8
Cooking	15,139	55	7.1	17,889	64	8.2	18,056	65	8.3
Lighting	4,778	17	2.3	3,944	14	1.8	3,333	12	1.5
Electrical appliances	9,028	33	4.3	11,806	43	5.4	14,444	52	6.6

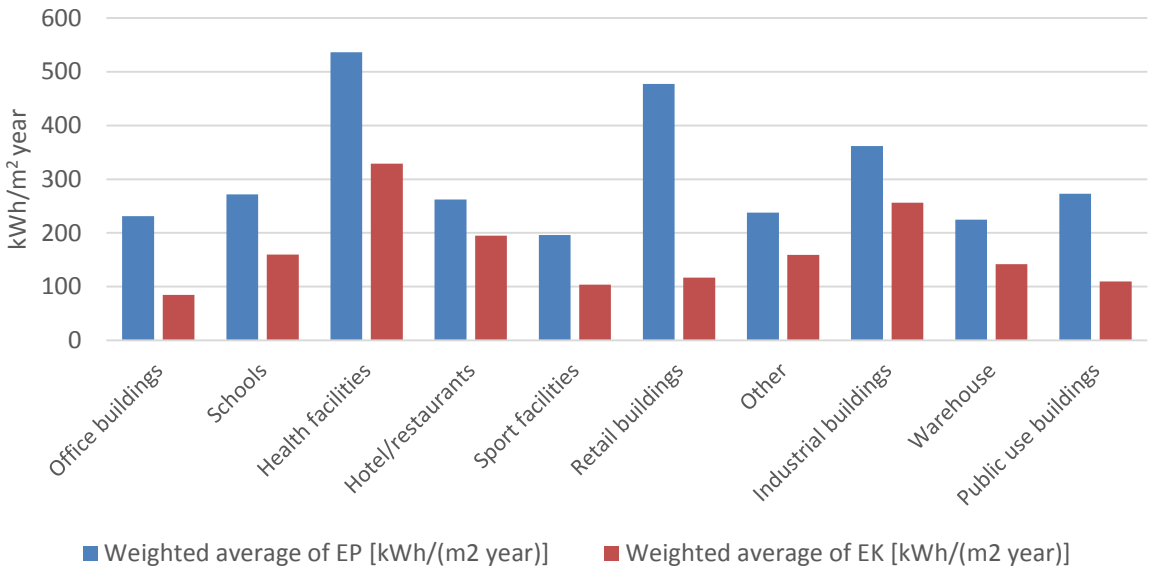
Figure 4 – Final energy consumption in households in 2002 and 2012 (Source: Energy statistics, estimations of the Energy Market Agency S.A.)



Non-residential buildings

For non-residential buildings, Figure 5 shows the highest delivered energy consumption (EK, represented by the red bars) is in healthcare.

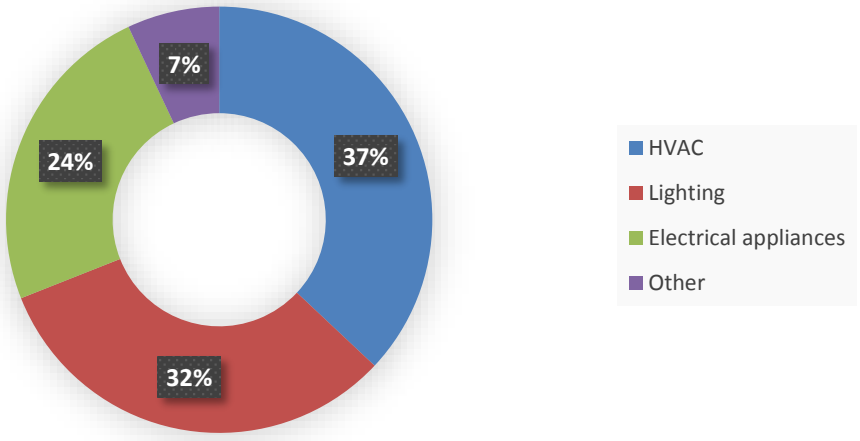
Figure 5 – Energy consumption in various types of non-residential buildings (Source: Raport: Stan energetyczny budynków w Polsce)



NOTE: The primary energy indicator (EP) concerns the index of non-renewable energy consumption for heating, ventilation and domestic hot water. Likewise, the final energy indicator (EK) concerns the energy demand for heating, ventilation and domestic hot water.

In non-residential buildings most energy is consumed for heating, ventilation and air conditioning (HVAC) (37%), followed by lighting (32%) and electrical appliances (24%) – see Figure 6.

Figure 6 – Structure of energy use in non-residential buildings in Poland (Source: Market Review – Poland, Energy Efficiency in Buildings)



Energy Performance

High demand for energy in buildings is due to low historic (and to a degree, existing) energy performance standards. This refers especially to single-family buildings located in the countryside. The review "Energy Consumption in Households" shows that the majority of single- and multi-family buildings has no insulation or is only partly insulated (Table 7).

Table 7 – Standard of buildings based on the criterion of thermal insulation – estimation of the number of buildings (Source: Energy Efficiency in Poland 2013 Review, IEE, Cracow, 2014)

Efficiency level of the building	Number of buildings		Building characteristics
	thousands	% of total	
Very high standard	45	1.2	• Modernised/modern installation • Wall insulation minimum 15 cm • Roof insulation • Energy efficient, triple glazed windows
High standard	335	6.7	• Modernised/modern installation • Wall insulation minimum 11 cm • Roof insulation • Double glazed windows
Average standard	1,000	20.1	• Modernised/modern installation • Wall insulation 8-10 cm • Roof insulation • Double glazed windows
Low standard	1,700	34.0	• Buildings with wall insulation layer thinner than 8 cm
Very low standard	1,900	38.0	• Uninsulated buildings

Amendments to the Polish regulations ought to result in the reduction of heat loss from buildings through the envelope and thus reduce energy consumption for heating. Table 8 specifies the minimum level of insulation of the building envelope U-value (W/m^2K), while Table 9 shows the maximum permissible demand for primary energy EP (kWh/m^2K).

Table 8 – Regulations concerning the heat transfer coefficient U for different building elements over time (Sources: norm PN-57/B-024051, PN-64/B-034041, PN-74/B-034042, PN-82/B-020202, PN-91/B-020202, www.gov.pl)

Period of validity	Polish legal norm	External wall	Roof	Ceiling above unheated basement	Ceiling under unheated attic	External windows and doors
		U-value (W/m^2K)				
1957-1964	PN-57/B-024051	1.16-1.42	0.87	1.16	1.04-1.16	
1964-1974	PN-64/B-034041	1.16	0.87	1.16	1.04-1.16	
1974-1982	PN-74/B-034042	1.16	0.70	1.16	0.93	

1982-1991	PN-82/B-020202	0.75	0.45	1.16	0.40	2.0-2.6
1991-2002	PN-91/B-020202	0.55-0.70	0.30	0.60	0.30	2.0-2.6
2002-2008	Dz. U. 2002 nr. 7 poz. 690	0.30-0.50	0.30	0.60	0.30	2.0-2.6
2009-2013	Dz. U. 2008 nr 201 poz. 1238	0.30	0.25	0.45	0.25	1.7-1.8
2014-2016	Dz.U. 2013 poz. 926	0.25	0.20	0.25	0.20	1.3-1.5
2017-2020		0.23	0.18	0.25	0.18	1.1-1.3
From 2021		0.20	0.15	0.25	0.15	0.9-1.1

The present legislation, which imposes the obligation to maintain adequately high energy standards, applies only to buildings currently being designed and constructed. As for older buildings, built before 1991, when the rules regarding insulation of the building envelope were less rigorous, thermal insulation was a rarity and thus these buildings have a very high energy demand.

Table 9 – Permissible level of Primary Energy (EP) for newly designed buildings (Source: „Rozporządzenie Ministra Transportu, Budownictwa i Gospodarki Morskiej z dnia 5 lipca 2013r. zmieniające rozporządzenie w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie")

Type of building	**Indicator EP_{H+W} for heating, ventilation and DHW heating [kWh/(m^{2}year)]**		
	from 1st Jan 2014	from 1st Jan 2017	from 1st Jan 2021*
Residential building: a) detached b) multifamily	 120 105	 95 85	 70 65
Collective residential building	95	85	75
Public utility building a) health care b) others	 390 65	 290 60	 190 45
Farm building, warehouse, production	110	90	70

* From 1st Jan 2019 in the case of buildings occupied and owned by public authorities

With regard to existing residential buildings, the optimal level of demand for non-renewable primary energy and final energy for heating, ventilation and DHW heating (source: Source: S. Mankowski, E. Szczechowiak, Strategic research project entitled "Integrated system for reducing operating energy consumption in buildings" Research Task No. 2 Volume I, Part A: Conditions of transformations in construction) is the following:

- Existing buildings, built after 1970:
  - EP = 50-75 kWh/(m^{2}year); EK = 45-68 kWh/(m^{2}year);
- Older buildings, built before 1970:
  - EP = 75-100 kWh/(m^{2}year); EK = 65-90 kWh/(m^{2}year);
  - Taking into account the share of RES, EP could be reduced to 50-75 kWh/(m^{2}year).

Achieving the indicated energy performance parameters requires comprehensive thermo-modernisation of buildings.

The largest group of buildings that have undergone thermo-modernisation were built between 1967 and 1985 (Table 10).

Table 10 – Thermo-modernisation statistics (Source: Polish Building Typology TABULA Scientific Report, NAPE)

Construction period	Percent of stock that has been thermo-modernised
up to 1945	7%
1946-1966	11%
1967-1985	16%
1986-1992	14%
1993-2002	8%
2002-2008	New buildings constructed under prevailing obligatory energy performance standards
after 2008	

Summary of the Polish Building Stock

Based on the above analysis, it can be concluded that Poles live in homes that are inadequately insulated against heat loss. Heating technology is outdated and the most popular fuel is highly polluting coal, burned in old coal-fired boilers. It is estimated that more than 70% of detached single-family houses in Poland (3.6 million) have no, or inadequate, thermal insulation. Only 1% of all houses in Poland can be considered energy efficient, primarily those that have been built in the last few years. Most of the buildings without thermal insulation had been built before 1989.

Data from the Central Statistical Office indicates that about 50% of residential buildings in Poland have been insulated, but in the majority of cases to a sub-optimal level. Given that the economic case for improving the insulation of these partially insulated buildings is not favourable, it can be concluded that the remaining 50% of buildings should be prioritised for thermo-modernisation.

2 The renovation market in Poland

The aim of an energy renovation is to make improvements which contribute to reducing the demand for energy supplied to the building. We can distinguish three stages of renovation, as presented in Table 11.

Table 11 – Stages of building renovation (Source: Dz.U. 2008 no 223 poz. 1459 USTAWA z dnia 21 listopada 2008 r. o wspieraniu termomodernisacji i remontów oraz opracowanie własne)

Stages of building thermo-modernisation	Activities to achieve the desired degree of renovation
Light renovation	• Modernisation or replacement of heat source;
Medium renovation	• Modernisation or replacement of heat source together with: • Replacement of window and door joinery; or • Thermal insulation of a façade.
Complex renovation	• Total or partial replacement energy sources, the use of renewables or the use of high-efficiency cogeneration; • Replacement of the central heating and DHW with insulation (in accordance with current technical and construction regulations); • Replacement of external window and door joinery; • Insulation of the whole external envelope (façades, flat roof and the ceiling/ floor); • Repair of balconies.

Residential Buildings

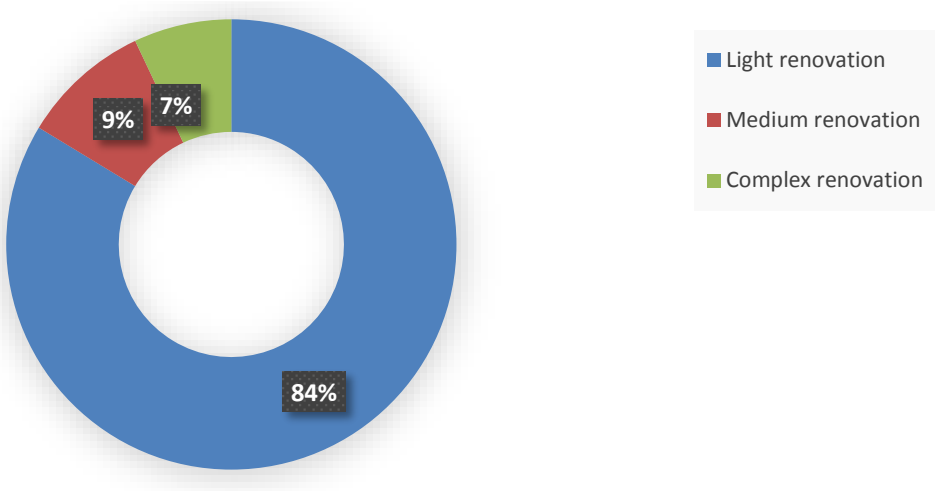
Table 12 – Annual renovation of residential buildings according to level [thousand] (Source: Bank Gospodarstwa Krajowego and NAPE own elaboration)

Level of building renovation	2006	2007	2008	2009	2010	2011	2012	2013
Light renovation	36.0	33.0	30.0	32.0	29.0	27.0	32.0	34.0
Medium renovation	4.0	3.7	3.3	3.6	3.2	3.0	3.5	3.7
Complex (deep) renovation	1.7	4.0	2.7	3.1	2.7	3.3	2.7	0.8
Total renovation	42.0	41.0	36.0	39.0	34.0	33.0	38.0	38.0

In most of the cases modernisation of residential buildings means only a change of heat source or modernisation of the heating system. Such solutions result in only a small reduction of the final energy demand – about 10% and it is usually a result of essential replacement of outdated equipment.

Grades of modernisation in residential buildings from 2006 to 2013 are presented in Figure 7.

Figure 7 – Grades of modernisation in residential buildings (Source: Bank Gospodarstwa Krajowego and NAPE own elaboration)



The annual costs of residential building renovation (defined in 2008 and 2013) regarding m^2 of heated usable area is presented in Table 13.

Table 13 – Estimated cost of the renovation work [per m2] (Source: NAPE own elaboration)

Stage of renovation	unit	2008	2013
Light renovation	€/m^2	30	40
Medium renovation	€/m^2	60	75
Complex renovation	€/m^2	100	125
Average	€/m^2	40	52

Table 14 – Estimated scale of investment by type of renovation work (Source: NAPE own elaboration)

Activity		2006	2007	2008	2009	2010	2011	2012	2013
Roof insulation	mln €	11	22	15	17	15	18	15	7
Façade insulation	mln €	179	345	240	277	240	280	247	108
Replacement of windows	mln €	156	301	209	241	210	244	216	94
Modernisation or exchange of heating system	mln €	51	98	68	79	68	80	70	31
Other actions	mln €	9	17	12	13	12	14	12	5
Total renovations	mln €	405	782	544	627	545	636	560	245

The decrease in 2013 was caused by a smaller number of complex renovations.

Non-Residential Buildings

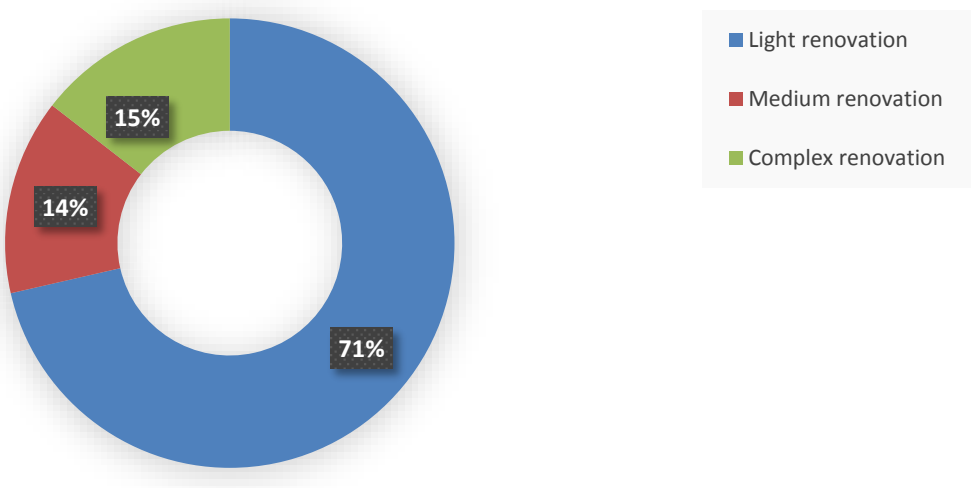
Grades of modernisation in non-residential buildings in the period from 2006 to 2013 are presented in

Figure 8.

Table 15 – Number of non-residential buildings after thermo-modernisation [thousand] (Source: Bank Gospodarstwa Krajowego and NAPE own elaboration)

Stage of building renovation	2006	2007	2008	2009	2010	2011	2012	2013
Light renovation	7.6	7.0	5.8	5.6	4.9	4.5	4.3	4.1
Medium renovation	1.4	1.3	1.1	1.1	1.0	0.9	0.9	0.8
Complex renovation	1.1	1.2	1.1	1.1	1.1	1.1	1.1	1.0
Total renovation	10	10	8	8	7	7	6	6

Figure 8 – Grades of modernisation in non-residential buildings (2006 to 2013) (Source: Bank Gospodarstwa Krajowego and NAPE own elaboration)



The annual costs of non-residential building renovation (defined in 2008 and 2013) per m^2 of heated usable area is presented in Table 16.

Table 16 – Annual costs of renovation work [per m^2] (Source: NAPE own elaboration)

Stage of renovation	Unit	2006	2013
Light renovation	€/m^2	30	40
Medium renovation	€/m^2	60	80
Complex renovation	€/m^2	130	170
Average	€/m^2	40	55

3 Key renovation technologies and markets

Table 17 – Comparison of current and modern solutions and technologies (Source: Strategy for modernising buildings: Roadmap 2050; www.renowacja2050.pl)

	Available technologies	Modern solutions and technologies
Envelope insulation	Traditional insulation materials: • Stone wool, glass wool, slag wool; • Expanded polystyrene (EPS) and extruded polystyrene (XPS), polyurethane foam; • Blown-in fibres wool or cellulose; • Thermal spacer.	Modern materials: • Nano Cellular Polyurethane foam; • Aerogel; • Vacuum insulated panels – VIP.
Envelope prefabrication	• Prefabrication sandwich panels	• Prefabricated façade and roof modules used to construct a new building envelope outside the existing building; • Installation of prefabricated façades with solar thermal collectors.
Windows	Windows with low thermal conductivity: • Double or triple glazed; • Filled with noble gases like argon, krypton, xenon; • Low-E coating applied to the glass to reduce radiant heat transfer; • Shutters and window louvres; • Automatically controlled louvres.	Windows with very low thermal conductivity: • Increased insulation of the window frame; • Vacuum windows; • Dynamic glass (glass adapting to external conditions): thermal and electrochromic.
Roofing	• Cold roof (covered with reflective material); • Green roof (covered with vegetation).	• Materials reflecting thermal radiation, resistant to weather and UV radiation; • Roof integration of PV panels.
Ventilation and heating	• Automatic (humidity sensitive) air diffusers and humidity sensitive ventilation grilles; • Mechanical ventilation; • Hybrid ventilation; • Efficient recuperators - supply and exhaust ventilation with heat recovery.	• Advanced control systems of ventilation efficiency.
Installation of hot water and central heating	• High efficiency boilers; • RES - biomass boilers, heat pumps (air, ground); • Solar collectors (vacuum and flat); • Photovoltaic panels;	• Hybrid systems - solar collectors cooperating with heat pump systems; • Micro cogeneration; • Cogeneration; • Stirling's engine.

	Available technologies	Modern solutions and technologies
	• Heating mats (electrical) for floor and wall heating; • Fan heaters, radiant heating; • Automatic control and thermostatic valves; • Aerators to DHW installations.	•

Table 18 presents a summary of the average quantities and average prices of the most important materials used for the renovation and construction of new buildings in the years 2005 to 2013.

Table 18 – Materials market (market share or estimated costs) (Source: PRODCOM, GUS, Build Desk, Polish Windows and Doors Association, Eurobserver, Instal Reporter, IEO, The Polish Ventilation Association, WWEA)

Type	Sub type		Unit	Quantity (per annum)
Insulation material	**Thermal insulation**			
	Mineral-based: glass wool		thousand t	27
	Oil-based: e.g. polyurethane, expanded polystyrene		thousand t	33
	Mineral-based: exfoliated vermiculite and expanded clays		thousand t	249
	Mineral based: non-metallic insulating materials		thousand t	441
	Biomass based: wood wool		thousand t	5
Glazing/windows	**Multiple-walled insulating units of glass**		million m²	14
	Total windows market for new and renovation buildings		million units	8.76
	Thermal performance glazing	$U_w > 2$	%	8
		$1.4 < U_w < 2$	%	34
		$U_w < 1.4$	%	58
Lighting	**Manufacture of electric lighting equipment**			
	Tungsten halogen filament lamps for a voltage <= 100 V		million units	1.77
	Filament lamps		million units	16.64
Heating solutions	**Heat Pumps**			
	Aerothermal		thousand units	1.75
	Geothermal		thousand units	3.25
	Boilers			
	Gas boilers		thousand units	106.22
	Gas condensing boilers		thousand units	91.24
	Coal boilers		thousand units	182.2
	Biomass	Pellet	thousand units	1.7
		Wood chip and log	thousand units	6,16
		Total	thousand units	11.83
	Heat recovery system			
	Single-family		thousand units	5

Type	Sub type	Unit	Quantity (per annum)
Other	**Shading devices**		
	Curtains and interior blinds	million m²	1.7
	Shutters and blinds (plastic)	thousand t	13.98
	Shutters and blinds (iron)	thousand t	303.88
	Awning	thousand t	8.79
	Solar thermal systems	thousand m²	154.11

Table 19 – Materials market (installed capacity) (Source: PRODCOM, GUS, BuildDesk, Polish Windows and Doors Association, Eurobserver, Instal Reporter, IEO, The Polish Ventilation Association, WWEA)

Type	Sub type	Unit	Installed capacity
Other	**Photovoltaic systems total capacity**		
	Grid-connected distributed	MW	0.49
	Stand-alone domestic	MW	0.78
	Micro Wind		
	Cumulative micro wind capacities	kW	7.6
	Cumulative micro wind units	thousand units	3.2

Availability list of the most important and modern technology for the technologically advanced countries of the EU and Poland is presented in Table 20.

Table 20 – Availability of most modern building technologies (Source: Technology roadmap energy efficient building envelopes, IEA)

	EU	Poland
Double-glazed low-e glass	mature	mature
Window films	established	established
Window attachments (e.g. shutters, shades, storm panel)	mature	mature
Highly insulating windows (e.g. triple-glazed)	established	established
Typical insulation	mature	mature
Exterior insulation	mature	mature
Advanced insulation (e.g. aerogel, VIPs)	initial	non-existent
Air sealing	mature	established
Cool roofs	established	initial
BIPV/ advanced roofs	initial	non-existent
Prefabricated envelope	initial	non-existent

SECTION 2 – Financing schemes in Poland

1 Analysis of financing schemes and their impact on the renovation market

In Poland there are a variety of mechanisms supporting the improvement of energy efficiency of existing buildings. They promote the goals set in the National Action Plan for Energy Efficiency (NEEAP). The most important state programme is the **Thermo-renovation and Repairs Fund**, which funds the energy efficient refurbishment of housing.

Other schemes include programmes managed by the National Fund for Environmental Protection and Water Management (NFOŚiGW) and the Regional Funds for Environmental Protection and Water Management (WFOŚiGW) such as:

- **Air protection** – reduction of CO_2 emissions in public, residential and industrial buildings;
- **Ryś** – grants for thermo-renovation of single-family buildings;
- **Kawka** – reduction of low-level pollutant emissions by supporting an increase of energy efficiency and the development of distributed renewable energy sources;
- **Energy-saving investments** in small and medium-sized enterprises.

In the forthcoming period, **The Operational Programme Infrastructure and Environment 2014-2020**, funded from the EU Cohesion Fund, should complement and extend the programmes described above, contributing to achieving Poland's reduction in energy use. In the residential and public sector this programme will provide co-financing under *Investment Priority 4.iii. – Supporting energy efficiency, intelligent energy management and promotion of renewable energy sources for public infrastructure, including public buildings, and in the housing sector.* However, the exact conditions of the financial instruments are not yet available to the public.

Similar support will be offered by **The Regional Operational Programmes 2014-2020** funded by the European Regional Development Fund. In the residential and public sector this programme will provide co-financing under *Investment Priority 4.c. – Supporting energy efficiency, intelligent energy management and promotion of renewable energy sources for public infrastructure, including public buildings, and in the housing sector.*

The short descriptions of financing schemes that aim to improve the energy performance of existing buildings in Poland can be found below. **Detailed descriptions are provided in Appendix I.**
An overview of key financing schemes operating in other Central and Eastern European countries is provided in Appendix II.

It should be noted that the savings quoted below and in the appendices typically reflect the scheme designers' or scheme managers' estimates, rather than being based on evaluated data, which is generally not readily available.

Programme A – Thermo-renovation and Repairs Fund

The programme offers grants for renovation and repair of existing buildings. It targets mostly multi-family and public buildings. It is an ongoing programme administered by the National Economy Bank (BGK) since 1999, funded through national sources. The current annual budget amounts to around €49M, while in the years 1999-2014, a total of €449M was invested in the renovation of almost 35,000 buildings. Compared to the total number of buildings in Poland, it means that only 0.6% of the stock was renovated with the help of the programme. 94% of renovations were in multi-family buildings. In the case of single-family buildings, only 0.01% of them were renovated. While the programme is working as designed, the scale of funding available each year is too low to have any meaningful impact.

Programme B – "RYŚ" – Thermo-renovation of single-family residential buildings

The programme offers grants only for the renovation of single-family residential buildings. Its goal is to fill the gaps in the Thermo-renovation and Repairs Fund (programme A), because the share of single-family buildings renovated with its help was only 2% of all renovated buildings. The programme, administered by the national environmental fund NFOŚiGW, started in 2015 and is due to continue until 2023. The total budget is €95M for 2015-2020, including €29M for non-refundable forms of support. As a result, the programme managers have forecast that a reduction of final energy consumption of 300,000 GJ/year and a reduction of CO_2 emissions of 25,000 tonnes/year should be achieved.

Programme C – Air protection – Reduction of CO_2 emissions in public, residential and industrial buildings

This an ongoing programme administered by the regional environmental funds WFOŚiGW, the aim of which is to support investments contributing to reduction of CO_2 emission. The programme offers different forms of support depending on the region, including grants, subsidies or soft loans. Also, different measures are covered and include the complex thermo-renovation of public and residential buildings in order to reduce heat demand. The approximate yearly budget of all Regional Funds together amounts to €148M. The individual budget is indicated annually in each Fund based on demand.

Programme D – "KAWKA" – Reducing air pollution by supporting an increase of energy efficiency and development of distributed renewable energy sources

The programme is dedicated mainly to Local Government Units and can support, among other things, thermal renovation of multi-family buildings as well as educational campaigns. The programme, which started in 2014 and will end in 2020, is administered by the WFOŚiGW with a budget of €190M. Over its lifetime, the programme aims to achieve a reduction of 134,000 tonnes of CO_2 emission per year.

Programme E – Energy-saving investments in SMEs

The aim of the programme is to support projects in SMEs which improve energy efficiency. The reduction of energy consumption can be achieved, among other things, thanks to the thermo-renovation of buildings. The programme, administered by NFOŚiGW, started in 2014 and will end in 2017. The budget of €14M comes from the national budget. The expected environmental effect of the programme is a reduction of energy consumption by 150,000 MWh/year in 2015-2016.

Programme F - The Operational Programme Infrastructure and Environment (OP&IE) 2014-2020 (Investment Priority 4.iii.)

The programme supports investment projects involving deep comprehensive energy modernisation of multi-apartment residential and public buildings. Preferred projects are those that achieve energy savings above 60%. The programme, administered by NFOŚiGW, started in 2015 and will end in 2023. The budget amounts to €166M for public building renovation and €226M for residential building renovation. Expected results are:

- Reduction of GHG emissions of 120,000 tonnes of CO_2 equivalent per year;
- Reduction of primary energy consumption in public utility buildings of 240,000 kWh per year;
- Reduction of final energy consumption of 1,780,000 GJ per year.

Programme G – The Regional Operational Programmes 2014-2020 (Investment Priority 4.c.)

Similar to OP&IE (Programme F), this programme will support investment projects involving deep comprehensive energy modernisation of multi-apartment residential and public buildings. The definition of deep renovation depends on the region. The programme, administered by the WFOŚiGW, started in 2015 and will end in 2022. The budget is €986M for public building renovation and €481M for residential building renovation. Expected results depend on the region. At national scale, 4,158 buildings should be renovated and a reduction of primary energy consumption in public utility buildings of 617,933 MWh per year should be achieved.

Comparison of Programmes

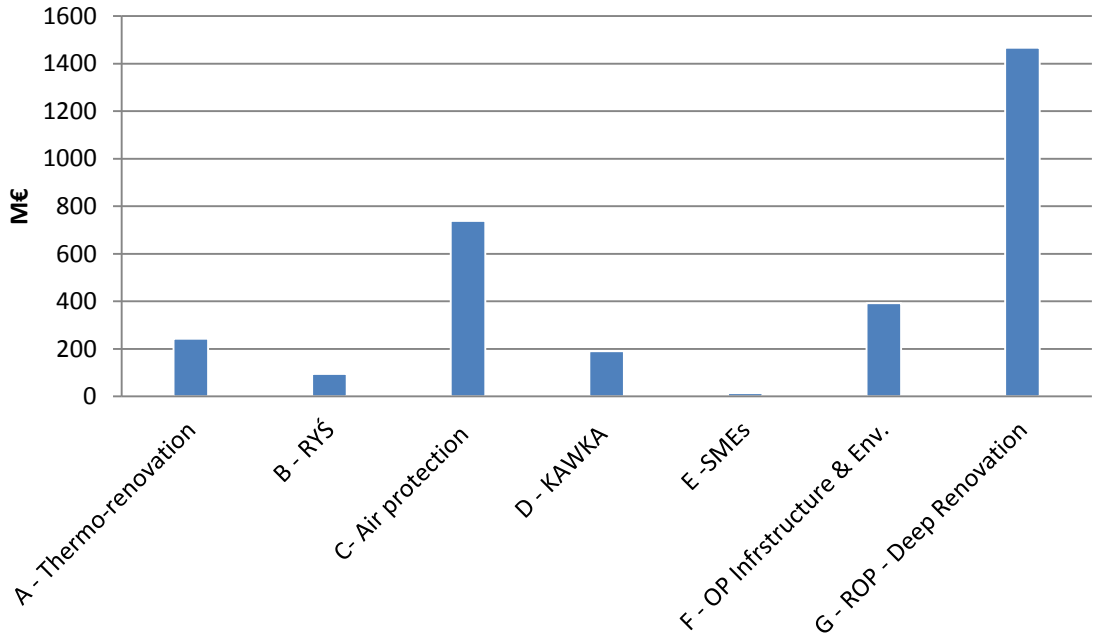
Measures covered by the above financing schemes are described in detail in Appendix I. It can be stated that the Thermo-renovation and Repairs Fund and RYŚ mainly support complex renovation (definition Table 11), while the Air Protection, KAWKA and SMEs programmes focus on lighter renovation. The Operational Programme Infrastructure and Environment and The Regional Operational Programmes mainly focus on deep renovations that improve energy efficiency by at least 60%.

Most of the financing schemes which support the improvement of energy efficiency of existing buildings require the preparation of an energy audit. The form of the audit is specified in the *Regulation of the Minister of Infrastructure and Development of 3 September 2015*, amending the regulation on the detailed scope and forms of energy audit and the part of repair audit, audit cards design, as well as the algorithm assessing the profitability of the thermo-modernisation project. The energy audit verifies the actual energy savings and helps in choosing the optimum renovation variant. The legal background and the general requirements regarding the thermo-modernisation projects

are specified in the *Act of 21 November 2008 on supporting the thermo-modernisation and repairs*. The Act and the Regulation specify the minimum technical requirements for buildings after renovation. The building envelope has to at least meet the requirements for U-values listed in Table 8 or the current year. There are no requirements referring to the primary energy consumption.

The maximum U-value after renovation and the efficiency of the heat recovery in the ventilation system are defined in the RYŚ programme. The requirements for building envelopes are more stringent and the same as for nZEBs in Poland (Table 8 from 2021), e.g. external wall 0.20 W/m^{2}K. There are no requirements in regard to the scale of energy reduction or the value of primary, final or net energy consumption after renovation.

Figure 9 – The budget of all programmes in 2015-2020

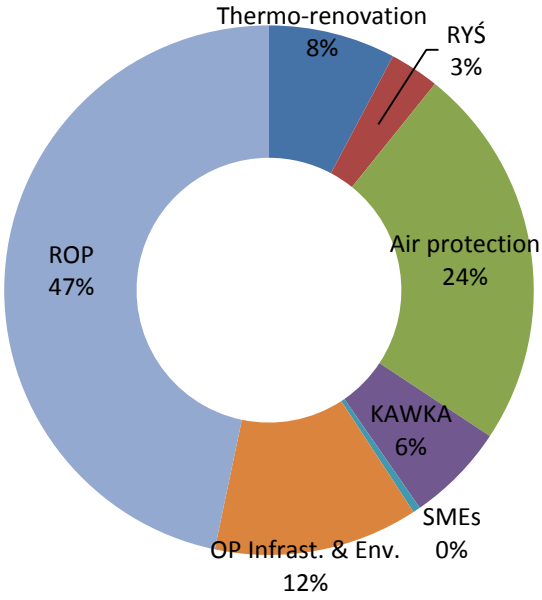


The total budget of all financing schemes for 2015-2020 was calculated on the basis of the following assumptions:

- €1 equals PLN 4.2;
- The yearly budget of the Thermo-renovation Fund is constant and equals €49M;
- The yearly budget of the Air protection programme is constant and equals €148M;
- The National and Regional Operational Programme budgets will be allocated annually until 2020.

The total budget of all programmes aiming at the improvement of the energy performance of existing buildings in Poland amounts to **€3,140M** until 2020. The distribution of the budget is shown below.

Figure 10 – Share of programmes in the total budget for 2015-2020



The allocation of financing schemes to the different target building sectors is presented in Table 21.

Table 21 – Target building sectors

Programme	Name	Residential – Single-family	Residential – Multi-family	Non-residential – Private	Non-residential – Public
A	Thermo-renovation and Repairs Fund	X	X	X	X
B	"RYŚ"	X			
C	Air protection	X	X	X	X
D	"KAWKA"		X		X
E	Energy-saving investments in SMEs			X	
F	OP Infrastructure & Environment		X	X	X
G	ROP		X	X	X

2 Mapping of existing funding to building typologies

Assumptions used to estimate the budget available for each building typology:

- On the basis of the structure of grant applications (all types) in the years 1999-2014, it was assumed that:
  - 94% of the funds will be allocated to multi-family buildings;
  - 4% of funds will be allocated to educational, health and public administration buildings;
  - 2% of funds will be allocated to single-family buildings.
- On the basis of previous competition results, the following allocation of the Air Protection funds, which are in the disposition of Regional Funds for Environmental Protection and Water Management (WFOŚiGW), was assumed:
  - 65% to educational, public administration and health buildings;
  - 17% to multi-family buildings;
  - 8% to industrial and commercial buildings;
  - 8% to religious establishments;
  - 2% to single-family buildings.
- On the basis of 2014 competition results, it was assumed that the KAWKA fund would be allocated as follows:
  - 70% to multi-family buildings;
  - 30% to educational, health and public administration buildings.

Table 22 – Building typology

Building type	Available financing schemes	Scale of funding available to 2020
Residential buildings		
Single-family	B - RYŚ A - Thermo-renovation Fund *C - Air protection*	€95.2M €4.9M €14.8M **€114.8M**
Multi-family	A - Thermo-renovation Fund F – OPI&E G - ROP *C - Air protection* *D - KAWKA*	€228.9M €225.6M €481.1M €125.5M €133.3M **€1,194.4M**
Non-residential buildings		
Industrial Commercial	E - Energy-saving investments *C - Air protection*	€14.3M €59.0M **€73.3M**
Educational Health Public administration	A - Thermo-renovation Fund F – OPI&E G - ROP *C - Air protection* *D - KAWKA*	€9.7M €165.9M €985.8M €479.7M €57.2M **€1,698.3M**

Other - including religious establishments	*C - Air protection*	**€59M**
TOTAL		**€3139.8M = €628M/a over the period 2016-2020**

Figure 11 – Mapping of existing funding until 2020 to the building typologies

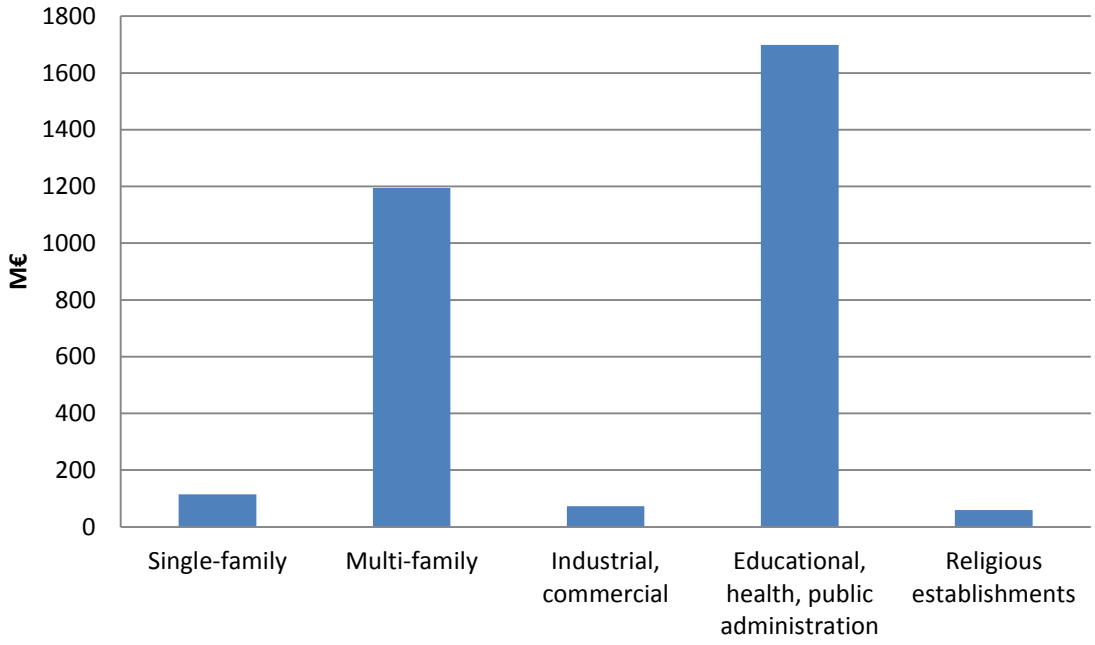
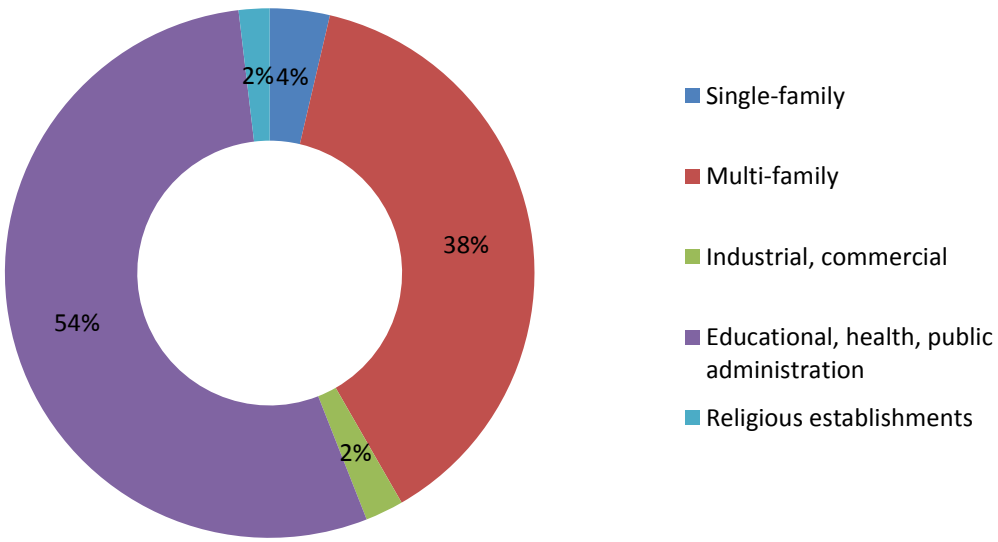


Figure 12 – Share of funding for different building typologies



The analysis has shown that, when dividing the total available funding over the period to 2020 by the number of buildings in each building type, available funds are as follows:

- Non-residential - €5,936 per building;
- Multi-family - €2,232per building;
- Single-family - €23 per building.

The available funds were compared with the average renovation costs for each building type[2]. The results are presented in the table below.

Table 23 – Comparison of renovation costs with available funding to 2020

Building type		Single-family residential	Multi-family residential	Non-residential
Average cost of comprehensive renovation (Table 11)	€	14,286	82,143	329,048
Available funding per building to 2020	€	23	2,232	5,936
Funding available per building as a proportion of total renovation cost	%	0.16%	2.72%	1.80%

Using the above data, the table below illustrates the numbers of buildings that could be renovated to 2020 with the available level of funding, assuming different levels of support, from 20% subsidy up to 85%. The top level of 85% has been chosen as this represents the typical subsidy in the national and regional Operational Programmes.

Table 24 – Potential number of renovated buildings to 2020 at different levels of support

Support level		Single-family residential	Multi-family residential	Non-residential
20%	No. of renovated buildings (% of total)	40,200 (0.8%)	72,700 (13.6%)	27,800 (9.0%)
30%	No. of renovated buildings (% of total)	26,800 (0.5%)	48,500 (9.1%)	18,500 (6.0%)
40%	No. of renovated buildings (% of total)	20,100 (0.4%)	36,400 (6.8%)	13,900 (4.5%)
85%	No. of renovated buildings (% of total)	9,500 (0.2%)	17,000 (3.2%)	6,500 (2.1%)

The comparison shows that in the case of multi-family buildings the scale of available funds will be sufficient to renovate between 3.2% and 13.6% of the total stock of these buildings in the 5 years to

[2] The average cost for multi-family and non-residential buildings was calculated on the basis of the report "Analiza przestrzenna (w województwach Polski) aktywności samorządów w zakresie gospodarki niskoemisyjnej w latach 2007-2011". The average cost for single-family building was estimated on the basis of the RYŚ programme for buildings with a 120m^2 living area.

2020 – equivalent to an annual rate of 0.6-2.7%. In the case of non-residential buildings the corresponding annual rate is 0.4-1.8%.

However, for single-family buildings, currently available funds will only be sufficient to renovate between 0.2% and 0.8% of homes over the next five years, equivalent to an annual rate of 0.04-0.16%. It is clear that the available support is woefully insufficient, and also far below the level of funding available for multi-family houses and non-residential buildings.

The above analysis shows that the priority focus for the evolution of existing financing schemes, and development of new support programmes, should be on single-family buildings.

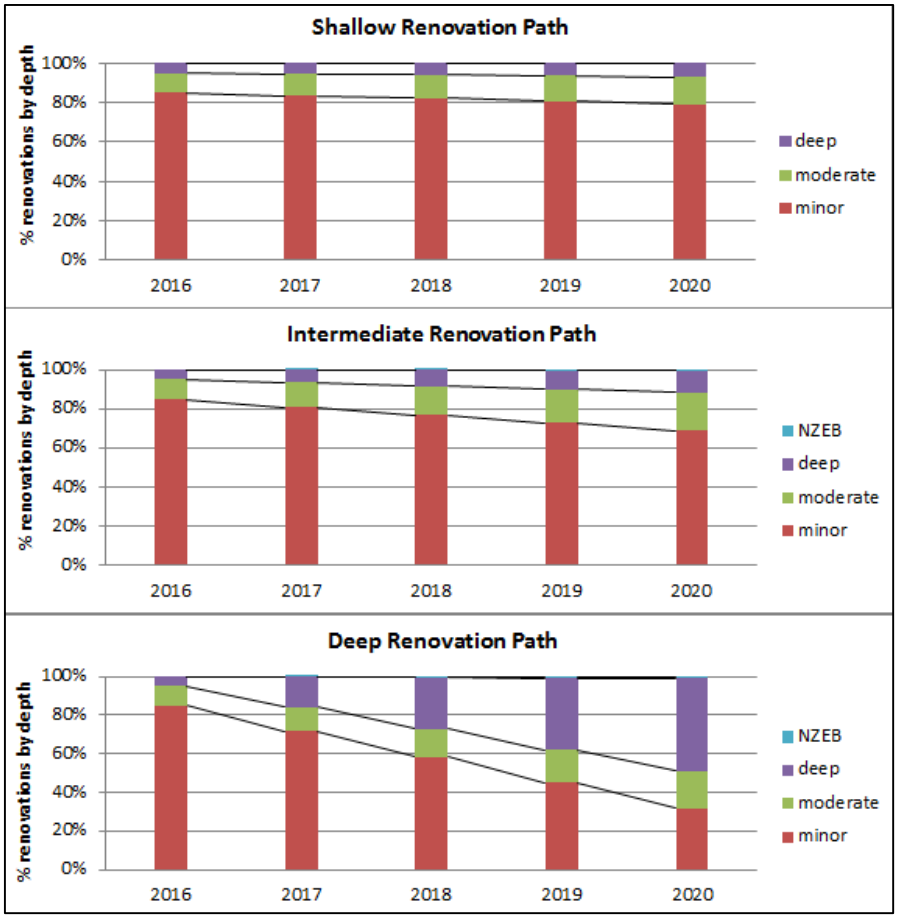
Modelling of renovation scenarios to 2020

In order to estimate the level of funding needed for different levels of renovation, BPIE modelled three scenarios, to compare with the current level of activity – the Business as Usual case. The three scenarios are:

- Modest – characterised by a slow rate of growth in the number of renovations, and a preponderance of shallow renovations;
- Intermediate- characterised by a moderate rate of growth in the number of renovations, and a steady growth of deeper renovations;
- Ambitious - characterised by a moderate rate of growth (as for the INTERMEDIATE scenario) in the number of renovations, but with a stronger focus on deep renovations, such that they account for around half of all renovations by 2020.

The profile of the three scenarios is summarised in the figure below. Renovations to nearly zero energy levels (NZEB) is limited to the Intermediate scenario, achieving 0.5% of all renovations in 2020, and to the Ambitious scenario, where they make up 1% of the total. The renovation types mean: minor – 0-30% of final energy reduction, moderate – 30-60% of final energy reduction, deep – 60-90% of final energy reduction and nZEB – more than 90% of final energy reduction.

Figure 13 – Profile of renovation pathways for the three scenarios



Key results from the model are presented in the table below. While all scenarios show a net benefit to consumers and to society, the greatest benefits and return on investment is achieved under the Ambitious scenario. Job creation in this scenario, at 52,000 person-years, is more than twice the level achieved under the Business As Usual scenario.

Table 25 – Key model outputs

Indicator		Business As Usual	Modest	Intermediate	Ambitious
Annual energy saving in 2020	TWh/a	3.3	4.3	5.9	9.9
2020 saving as % of today	%	1.1%	1.5%	2.0%	3.4%
Investment (present value)	€bn	2.2	2.8	3.6	5.3
Energy cost savings (present value)	€bn	5.0	6.5	9.0	15.0
Net saving (cost) to consumers	€bn	2.8	3.7	5.3	9.6
Net saving (cost) to society	€bn	10.0	13.1	18.3	31.7
Internal rate of return	IRR	13.1%	13.4%	14.0%	15.5%
Average annual net jobs generated		21,122	26,944	35,158	52,067

Total annual investment would reach €0.8bn in the Modest scenario, rising to €1.9bn in the Ambitious scenario. This compares to the current level of public funding of €0.63bn. Given that the

largest funds currently offer subsidies of 85%, public funding accounts for the majority of investment in renovation at the present time.

Key Findings

In order for the Ambitious scenario to be realised:

- Public funding for renovation needs to be increased, notably for single family houses;
- Levels of gearing, i.e. proportion of funding from third parties such as building owners and other investors, need to be improved;
- The focus should shift towards achieving comprehensive, deep renovations;
- Sub-optimal measures such as low insulation thicknesses should not be permitted under publicly funded schemes;
- Financial schemes need to be devised which offer an attractive and engaging way for building owners to invest in renovation.

APPENDIX I – Key funding schemes currently operational in Poland

Programme A - Thermo-renovation Fund

Source of data: National Economy Bank (BGK)

<table>
<tr><td>Programme name</td><td colspan="4">Thermo-renovation Fund</td></tr>
<tr><td>Start - end dates</td><td colspan="4">From 1999 - ongoing</td></tr>
<tr><td>Type of programme (e.g. subsidies, grants, preferential loans, personal income taxes reduction, etc.)</td><td colspan="4">Grant for the renovation and repair of existing buildings</td></tr>
<tr><td rowspan="3">Targeted existing buildings:</td><td colspan="2">Residential</td><td colspan="2">Non-residential</td></tr>
<tr><td>Single-family</td><td>Multi-family</td><td>Privately owned</td><td>Publicly owned</td></tr>
<tr><td>X</td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>Budget/source</td><td colspan="4">Current annual budget €48.7M (€448.8M spent in 2009-2014) – from national budget</td></tr>
<tr><td>Administrator</td><td colspan="4">Bank Gospodarstwa Krajowego (BGK) – National Economy Bank</td></tr>
<tr><td>Measures covered</td><td colspan="4">• Thermo-renovation;
• Structural repairs;
• Decreasing the losses in district heating networks;
• Change of heat source.</td></tr>
<tr><td>Coverage</td><td colspan="4">National</td></tr>
<tr><td>Criteria</td><td colspan="4">The investor is entitled to a grant to repay part of the loan if the energy audit shows that the project will:
1) Reduce the annual energy demand (for heating and DHW):
a) in buildings where only the heating system is modernised – at least by 10%;
b) in buildings where after 1984, the heating system was modernised – at least by 15%;
c) in other buildings – at least by 25%; or
2) Decrease annual energy losses in the district heating network, at least by 25%; or
3) Reduce annual costs of obtaining heat from the heat source, at least by 20%; or
4) Change the energy source to RES or cogeneration.</td></tr>
<tr><td>Scale of support:</td><td colspan="4">The amount of the thermo-renovation grant may not be more than:
1) 16% of the costs incurred for the thermo-renovation project, and
2) Twice the expected annual savings in energy costs, determined on the basis of the energy audit and;
3) 20% of the used credit amount contracted for the thermo-renovation project.</td></tr>
<tr><td>Programme impact (targeted or achieved) – e.g. energy and carbon savings, macro-economic benefits, triggered private investments, etc.</td><td colspan="4">The structure of grant applications (all types) by modernised building types in 1999 -2014:
• Multi-family buildings – 32,756;
• Public buildings – 1,296;
• Single-family buildings – 731;
• Local heat source – 106;
• Collective accommodation buildings – 96;
• Heating networks – 53;
• Other heat sources – 6.
Some figures:
• €2,649M – the value of projects implemented with the support of the Fund until 2014;
• €2,061M – the value of loans with the grant until 2014;
• 5.26% – average interest on loans with the grant in 2014;
• €190M – the amount of annual energy cost savings resulting from thermo-renovation projects realized in the years from 1999-2014 with the support of the Fund.</td></tr>
</table>

Programme B - RYŚ

Source of data: National Fund for Environmental Protection and Water Management

<table>
<tr><td>Programme name</td><td colspan="4">RYŚ (“Lynx”)</td></tr>
<tr><td>Start – End Dates</td><td colspan="4">2015-2023</td></tr>
<tr><td>Type of programme (e.g. subsidies, grants, preferential loans, personal income taxes reduction, etc.)</td><td colspan="4">• Grant for the energy evaluation of the building and preparation of project documentation;
• Grant to repay part of the loan or credit taken for the realization of renovation works;
• Total cost of credit / loan: up to 4% in the first year and 2.5% in the subsequent years of the loan;
• Maximum repayment period of credit / loan: 15 years.</td></tr>
<tr><td rowspan="3">Targeted existing buildings:</td><td colspan="2">Residential</td><td colspan="2">Non-residential</td></tr>
<tr><td>Single-family</td><td>Multi-family</td><td>Privately owned</td><td>Publicly owned</td></tr>
<tr><td>X</td><td></td><td></td><td></td></tr>
<tr><td>Budget/source</td><td colspan="4">€95.2M for 2015-2020 (including €28.6M for non-refundable forms of grants)/ NFOŚiGW</td></tr>
<tr><td>Administrator</td><td colspan="4">The National Fund for Environmental Protection and Water Management (NFOŚIGW)</td></tr>
<tr><td>Measures covered</td><td colspan="4">Thermo-renovation of single-family residential buildings</td></tr>
<tr><td>Coverage</td><td colspan="4">National</td></tr>
<tr><td>Criteria</td><td colspan="4">Financed renovation works are divided into three groups:
I. Decreasing the heat losses through the envelope, e.g. insulation of external wall, change of windows;
II. Building systems, e.g. modernisation of heating and DHW system, installation of balanced ventilation with heat recovery;
III. Change of heat source and use of RES.
The renovation works have to fulfil the requirements of the programme, e.g. max U-value after renovation, efficiency of the heat recovery in ventilation system. The requirements for the building envelope are the same as for nZEBs in Poland, e.g. external wall 0,20 W/m^{2}K. There are no requirements regarding the scale of energy reduction or the maximal value of primary, final or net energy consumption after renovation.</td></tr>
<tr><td>Scale of support</td><td colspan="4">• Grant for the energy evaluation of the building and preparation of project documentation – financed entirely through grants;
• The grant for renovations convers 20% or 40% of renovation costs (for renewable energy sources – 15% after 2017);
• The scale of the support depends on the scope of renovation works, e.g. change of heat source to RES 20% (15% after 2017), insulation of external walls 20%, insulation of external walls and roof 40%.</td></tr>
<tr><td>Programme impacts (targeted or achieved) – e.g. energy and carbon savings, macro-economic benefits, triggered private investments, etc.</td><td colspan="4">The expected impacts are:
• Reduction of final energy consumption by 300 000 GJ/year;
• Reduction of CO_2 emissions by 25 000 tonnes/year;
• Reduction of PM10 particulates emissions by 50 tonnes/year;
• Reduction of PM2.5 particulates emissions by 45 tonnes/year.</td></tr>
</table>

Programme C - Air protection

Source of data: Regional Funds for Environmental Protection and Water Management, National Energy Conservation Agency

<table>
<tr><td>Programme name</td><td colspan="4">Air protection – reduction of CO_2 emissions in public, residential and industrial buildings</td></tr>
<tr><td>Start – End Dates</td><td colspan="4">Not limited</td></tr>
<tr><td>Type of programme (e.g. subsidies, grants, preferential loans, personal income taxes reduction, etc.)</td><td colspan="4">Grants, subsidies, soft loans</td></tr>
<tr><td rowspan="3">Targeted existing buildings:</td><td colspan="2">Residential</td><td colspan="2">Non-residential</td></tr>
<tr><td>Single-family</td><td>Multi-family</td><td>Privately owned</td><td>Publicly owned</td></tr>
<tr><td>X</td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>Budget/source</td><td colspan="4">€147.6M (approximate yearly budget of all Regional Funds), the budget is indicated yearly in each Fund based on demand / Regional Funds for Environmental Protection and Water Management (WFOŚIGW)</td></tr>
<tr><td>Administrator</td><td colspan="4">Regional Funds for Environmental Protection and Water Management</td></tr>
<tr><td>Measures covered</td><td colspan="4">Depending on the Regional Fond, the following measures can be covered:
Complex thermo-renovation of public and residential buildings in order to reduce heat demand;
Use of ventilation systems with heat recovery;
Development of a district heating network, connection of existing buildings to the network;
Replacement, construction or modernisation of heating systems using renewable energy sources;
Production of heat and electricity from cogeneration using renewable energy sources;
Replacement, construction or modernisation of local heat sources using coal in order to reduce low emissions;
Use of RES, mainly solar energy, to reduce the emissions caused by non-renewable heat sources like coal.</td></tr>
<tr><td>Coverage</td><td colspan="4">Regional</td></tr>
<tr><td>Criteria</td><td colspan="4">Depending on the Regional Fund, they can be:
More formal, less qualitative;
Energy demand for heating reduced by min 20% or 40%;
Energy demand of one building or buildings for heating reduced by min. 150 GJ/ year or 300 GJ/ year;
The environmental effect – scale of PM2.5, PM10 and CO_2 emissions reduction in Mg/year.</td></tr>
<tr><td>Scale of support</td><td colspan="4">Depending on the Regional Fund:
Grant, subsidies from 30% to 85%;
Soft loan for 100% of the investment cost.</td></tr>
</table>

Programme D - KAWKA

Source of data: National Fund for Environmental Protection and Water Management

<table>
<tr><td>Programme name</td><td colspan="4">KAWKA (“Jackdaw”) – Reduction of low-level emissions by supporting an increase of energy efficiency and the development of distributed renewable energy sources.</td></tr>
<tr><td>Start – End Dates</td><td colspan="4">2014-2020</td></tr>
<tr><td>Type of programme (e.g. subsidies, grants, preferential loans, personal income taxes reduction, etc.)</td><td colspan="4">Grants, soft-loans</td></tr>
<tr><td rowspan="3">Targeted existing buildings:</td><td colspan="2">Residential</td><td colspan="2">Non-residential</td></tr>
<tr><td>Single-family</td><td>Multi-family</td><td>Privately owned</td><td>Publicly owned</td></tr>
<tr><td></td><td>X</td><td></td><td>X</td></tr>
<tr><td>Budget/source</td><td colspan="4">€190.5M / €95.2M from Regional Funds for Environmental Protection and Water Management</td></tr>
<tr><td>Administrator</td><td colspan="4">Regional Funds for Environmental Protection and Water Management</td></tr>
<tr><td>Measures covered</td><td colspan="4">The following can be funded in particular:
1. Projects aimed at reducing low emissions related to improving energy efficiency and the use of high-efficiency cogeneration systems and renewable energy sources, like:
a. Elimination of local heat sources;
b. The use of solar collectors in order to reduce emissions;
c. Thermal renovation of multi-family buildings in accordance with the terms resulting from the energy audit performed.
2. Educational campaigns (for beneficiaries) showing the health and social benefits from the elimination of low emissions.</td></tr>
<tr><td>Coverage</td><td colspan="4">Regional</td></tr>
<tr><td>Criteria</td><td colspan="4">• The environmental effect – scale of PM2.5, PM10 and CO_2 emissions reduction in Mg/year;
• Cost effectiveness – the eligible cost of the project in EUR/ reduction of emissions of particulate matter PM10 expressed in Mg/year.</td></tr>
<tr><td>Scale of support</td><td colspan="4">The amount of support can reach 90% of eligible costs, including up to 45% of eligible costs of the project with funds made available by the National Fund in the form of grants.</td></tr>
<tr><td>Programme impacts (targeted or achieved) – e.g. energy and carbon savings, macro-economic benefits, triggered private investments, etc.</td><td colspan="4">Reducing the exposure of people to the effects of air pollution in areas where the permissible and target levels of concentrations of these pollutants are significantly exceeded, through the development of air protection programmes and by reducing emissions, especially PM2.5 and PM10 particulates as well as CO_2.
Assumed reduction of:
• MP10 per year at the end of the project, 630 tonnes/year;
• MP2.5 per year at the end of the project, 620 tonnes/year;
• CO_2 per year at the end of the project, 134 000 tonnes/year.</td></tr>
</table>

Programme E - Energy-saving investments in SMEs

Source of data: National Fund for Environmental Protection and Water Management

<table>
<tr><td>Programme name</td><td colspan="4">Energy-saving investments in small and medium-sized enterprises</td></tr>
<tr><td>Start – End Dates</td><td colspan="4">2014-2017</td></tr>
<tr><td>Type of programme (e.g. subsidies, grants, preferential loans, personal income taxes reduction, etc.)</td><td colspan="4">Grants for partial repayment of bank loans channelled through the bank on the basis of the cooperation agreement concluded with the National Fund.</td></tr>
<tr><td rowspan="3">Targeted existing buildings:</td><td colspan="2">Residential</td><td colspan="2">Non-residential</td></tr>
<tr><td>Single-family</td><td>Multi-family</td><td>Privately owned</td><td>Publicly owned</td></tr>
<tr><td></td><td></td><td>X</td><td></td></tr>
<tr><td>Budget/source</td><td colspan="4">€14.3M/NFOŚIGW</td></tr>
<tr><td>Administrator</td><td colspan="4">The National Fund for Environmental Protection and Water Management (NFOŚIGW)</td></tr>
<tr><td>Measures covered</td><td colspan="4">The following projects are eligible for financing under the programme:
1. LEME (List of Eligible Materials and Equipment – the LEME list is published at www.nfosigw.gov.pl) investments – initiatives including the implementation of investment activities in the following areas:
a. Improving energy efficiency and/or use of renewable sources of energy;
b. Thermo-renovation of buildings and/or use of renewable sources of energy, both through the purchase of materials/equipment/technology listed on the LEME list.
This includes projects for which financing in the form of a loan with a subsidy does not exceed €250,000;
2. Assisted investments – projects including the implementation of investment activities that did not qualify as LEME investment in:
a. Improving energy efficiency and/or use of renewable energy sources as a result of which min. 20% energy savings are reached;
b. Thermo-renovation of buildings and/or use of renewable energy sources as a result of which at least 30% energy savings are reached.
This includes projects for which financing in the form of a loan with a subsidy will not exceed €1,000,000.</td></tr>
<tr><td>Coverage</td><td colspan="4">National</td></tr>
<tr><td>Criteria</td><td colspan="4">1. Submission to a bank that has a collaboration agreement with the National Fund, a grant application for the partial repayment of the bank loan, which is complete and consistent with the terms of this programme.
2. Granting the applicant the bank loan with a subsidy for realization of the project.</td></tr>
<tr><td>Scale of support</td><td colspan="4">From 10% to 15% of bank loan capital</td></tr>
<tr><td>Programme impacts (targeted or achieved) – e.g. energy and carbon savings, macro-economic benefits, triggered private investments, etc.</td><td colspan="4">Environmental effect in the years 2015-2016: reduction of energy consumption by 150,000 MWh/year.</td></tr>
</table>

Programme F - Operational Programme Infrastructure and Environment

Source of data: The Operational Programme Infrastructure and Environment 2014-2020, National plan for increasing the number of nearly zero energy buildings in Poland

<table>
<tr><td>Programme name</td><td colspan="4">OPI&E – The Operational Programme Infrastructure and Environment 2014-2020 (Investment Priority 4.iii.) – Supporting energy efficiency, intelligent energy management and promotion of renewable energy sources for public infrastructure, including public buildings, and in the housing sector</td></tr>
<tr><td>Start – End Dates</td><td colspan="4">2014-2023</td></tr>
<tr><td>Type of programme (e.g. subsidies, grants, preferential loans, personal income taxes reduction, etc.)</td><td colspan="4">Grants only – public utility buildings
Soft loans – residential buildings</td></tr>
<tr><td rowspan="3">Targeted existing buildings:</td><td colspan="2">Residential</td><td colspan="2">Non-residential</td></tr>
<tr><td>Single-family</td><td>Multi-family</td><td>Privately owned</td><td>Publicly owned</td></tr>
<tr><td></td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>Budget/source</td><td colspan="4">€165.9M – public buildings, €225.6M – residential buildings / contributions from the EU Cohesion Fund</td></tr>
<tr><td>Administrator</td><td colspan="4">National Fund for Environmental Protection and Water Management (NFOŚIGW)</td></tr>
<tr><td>Measures covered</td><td colspan="4">The support for investment projects involving deep comprehensive energy modernisation of multi-apartment residential and public buildings, covers elements such as:
• Insulation of a building, replacement of windows, external doors, and replacing lighting with energy-efficient one;
• Alterations in the heating system (including changing the source of heat and replacing it with a more energy efficient and eco-friendly one);
• Installation of cooling systems, also including the use of RES;
• Modernisation of ventilation and air conditioning systems;
• Application of weather-sensitive automatic temperature regulation;
• Use of energy management systems in buildings;
• Installation of micro-cogeneration or micro-trigeneration for own needs;
• Installation of RES in energy-modernised buildings;
• Creation of green roofs and "living green walls";
• Carrying out of energy audits as part of investment projects.</td></tr>
<tr><td>Coverage</td><td colspan="4">National</td></tr>
<tr><td>Criteria</td><td colspan="4">In terms of deep comprehensive renovation, buildings projects characterized by the best energy efficiency will be preferred, meaning projects that increase energy efficiency above 60%. Projects in the field of deep, comprehensive renovation that increase energy efficiency below 25%, however, will not be eligible for funding.
The construction of new high-efficiency cogeneration installations will be supported, if justified in economic terms and based on renewable energy with the lowest possible CO_2 and other air pollutants emissions. For new installations at least 10% yield energy efficiency should be achieved compared to separate production of heat and electricity using the best available technology. Moreover, any reconstruction of existing facilities for high efficiency cogeneration must result in a reduction of CO_2 emissions by at least 30% compared to existing installations.</td></tr>
<tr><td>Scale of support:</td><td colspan="4">• Public utility buildings: To 85%;
• Residential buildings: not set yet.</td></tr>
<tr><td>Programme impacts (targeted or achieved) – e.g. energy and carbon savings, macro-economic benefits, triggered private investments, etc.</td><td colspan="4">Predicted programme impact:
• Number of households with a better class of energy consumption (CI): 56,000;
• Installed power of RES: 50 MW;
• Assumed reduction of GHG emissions: 120,000 tonnes of equivalent CO_2 per year;
• Reduction of final energy consumption 1,780,000 GJ per year.</td></tr>
</table>

Programme G - Regional Operational Programmes

Source of data: Regional Operational Programmes, National plan for increasing the number of nearly zero energy buildings in Poland

<table>
<tr><td>Programme name</td><td colspan="4">ROP – Regional Operational Programmes (ROP) 2014-2020 (Investment Priority 4.c.) – Supporting energy efficiency, intelligent energy management and promotion of renewable energy sources for public infrastructure, including public buildings, and in the housing sector</td></tr>
<tr><td>Start – End Dates</td><td colspan="4">2014-2022</td></tr>
<tr><td>Type of programme (e.g. subsidies, grants, preferential loans, personal income taxes reduction, etc.)</td><td colspan="4">Grants only</td></tr>
<tr><td rowspan="3">Targeted existing buildings:</td><td colspan="2">Residential</td><td colspan="2">Non-residential</td></tr>
<tr><td>Single-family</td><td>Multi-family</td><td>Privately owned</td><td>Publicly owned</td></tr>
<tr><td></td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>Budget/source</td><td colspan="4">€985.8M – public buildings, €481.1 M – residential buildings / European Regional Development Fund (ERDF)</td></tr>
<tr><td>Administrator</td><td colspan="4">Regional Boards</td></tr>
<tr><td>Measures covered</td><td colspan="4">Support for energy efficiency, smart energy management and the use of renewable energy sources in public infrastructure, including public buildings, and in the residential sector.
The support for investment projects involving (similar to The Operational Programme Infrastructure and Environment) deep comprehensive energy renovation of multi-apartment residential buildings and public utility buildings, covers elements such as:
• Insulation of a building, replacement of windows, external doors, and replacing lighting with energy-efficient one;
• Alterations in the heating system (including changing the source of heat and replacing it with a more energy efficient and eco-friendly one);
• Installation of cooling systems, also including the use of RES;
• Modernisation of ventilation and air conditioning systems;
• Application of weather-sensitive automatic temperature regulation;
• Use of energy management systems in buildings;
• Construction or modernisation of internal receiving installations, together with liquidation of existing heat sources;
• Installation of micro-cogeneration or micro-trigeneration for own needs;
• Installation of RES in energy-modernised buildings;
• Carrying out of energy audits as part of investment projects.</td></tr>
<tr><td>Coverage</td><td colspan="4">Regional</td></tr>
<tr><td>Criteria</td><td colspan="4">In most of the regions, like for The Operational Programme Infrastructure and Environment. The definition of deep, comprehensive energy renovation can in some cases differ from the one in OPI&E, e.g. buildings after renovation should meet the requirements of Polish nZEBs.</td></tr>
<tr><td>Scale of support</td><td colspan="4">Up to 85%</td></tr>
<tr><td>Programme impacts (targeted or achieved) – e.g. energy and carbon savings, macro-economic benefits, triggered private investments, etc.</td><td colspan="4">Table below</td></tr>
</table>

Table A1. Targeted regional impacts of Programme G

Source of data: Regional Operational Programmes

Region	Number of households with improved energy rating	Reduction of GHG emissions, tonnes of equivalent CO_2 per year	Reduction of primary energy consumption in public utility buildings, kWh per year	Number of energy renovated buildings	Other impacts
Małopolskie	5,800	3,000	1,990,000	48	
Świętokrzyskie	5,100	52,775	154,293,611	280	
Mazowieckie	7,300	78,500	109,000,000	400	installed RES: 13 MW
Zachodniopomorskie	568	23,615		95	
Warmińsko-mazurskie				536	
Pomorskie	1,280	28,214	23,400,000	460	
Lubelskie				161	cogeneration systems: 22
Wielkopolskie	610	61,140	155,969,000	264	
Kujawsko-pomorskie					
Podlaskie			71,903,551	249	
Łódzkie	2,750	93,276	1,152,982	418	
Dolnośląskie					useful area of renovated buildings: 668,193 m^2
Opolskie		20,300	46,988,000	77	
Śląskie				545	No. RES units: heating – 3258, electricity – 1629
Podkarpackie		75,000	30,000,000	500	
Lubuskie	2,118	15,823	23,194,578	125	
TOTAL (of available data)	**25,526**	**451,643**	**617,891,722**	**4,158**	

APPENDIX II – Key funding schemes currently operational in selected Central and Eastern European EU Member States

NOTE – This summary of funding schemes in selected Central and Eastern European countries is based on a report published by Gesellschaft für Internationale Zusammenarbeit (GIZ) in Serbia, presented to the Belgrade Parliament on 3rd December 2014. BPIE gratefully acknowledges the permission granted by GIZ to reproduce edited selections from the study, entitled "*Applicable financial models for rehabilitation of existing residential building stock and retrofits in Serbia and other relevant European countries*".

Bulgaria

Households are the third largest energy user in Bulgaria, making energy efficiency an increasingly important issue in the sector. According to the NEEAP, the unresolved problems in the household sector continue to be the low efficiency of domestic stoves and fireplaces run on wood and coal, as well as underdeveloped household gasification. Therefore, an incentive system which supports the renovation of residential buildings through **grants, credit line and tax exemption was established, with most of the programmes aimed at multi-apartment buildings.** The main umbrella programme is the *National Renovation Programme for Residential Buildings in Bulgaria 2006-2020*. This programme currently offers **grants for up to 100% of the budget for building renovation** and certain essential repairs.

Furthermore, a credit line facility, *REECL,* was created in 2005, a joint initiative of the European Commission, the European Bank for Reconstruction and Development, and the Bulgarian Energy Efficiency Agency. Each borrowing household will benefit from a 20% incentive towards the cost of the energy savings projects (to a maximum of €850). Finally, a **fiscal incentive for households**, also introduced in 2005, is the *Building tax exemption* lasting from three to seven years, depending on the 'EE classification of the building'.

Programme name	**National Renovation Programme for Residential Buildings in Bulgaria**			
Start – End Dates	2006–2020			
Type of programme	The Project aims to develop a replicable scheme for the renovation of multi-family buildings, consisting of 3 major components: a) Conditional subsidies to condominiums for renovation purposes; b) Facilitated access to loans for renovation; c) Technical assistance to the voluntarily associated homeowners of entire buildings for the organization of the renovation process.			
Targeted existing buildings:	Residential		Non-residential	
	Single-family	Multi-family	Privately owned	Publicly owned
	X	X		
Budget/source	€500M (BGN 1000M)			
Measures covered	The following activities are supported: energy efficiency measures – thermal and hydro insulation, replacement of windows and doors, treatment of the external façade panel joints, others recommended in the energy survey report, refurbishment on common parts related to EE and safe habitation – repair of the main entrance door, the roof overhang over the entrance and the entrance steps, painting of walls, others recommended in the technical survey report, replacement of old internal plumbing systems – replacement of the vertical main water supply and waste drain pipes, renovation of surrounding public areas.			
Scale of support:	Financial support of (currently) 100% of the budget for the renovation of the building / block section			
Programme impacts	Energy savings of 5,274 TJ (by 2020)			

Croatia

In the case of Croatia, the Environmental Protection and Energy Efficiency Fund (EPEEF) is one of the main authorities that facilitate programmes to promote EE in the residential sector. The Fund co-finances EE programmes in line with the NEEAP and is primarily **financed with funds obtained from the auction sale of emission units** derived from the quotas allocated to plants in Croatia, in accordance with the Air Protection Act.

All of the programmes are ongoing **co-financing and grants-based programmes**, planned for the period 2014-2020. They are aimed at:

- Improving outer envelopes;
- Heating system replacement;
- Use of renewable energy sources.

The whole programme is funded by the Environmental Protection and Energy Efficiency Fund, the EU Structural Funds, local and regional self-government units and Sources of financing for citizens.

In addition to the aforementioned programmes, a programme aimed at the **introduction of individual metering of energy consumption** is also ongoing, which is a precondition for all future energy efficiency activities in residential buildings.

Programme name	**Programme of energy renovation of family homes**			
Start – End Dates	2014-2020			
Type of programme	Grants/subsidies			
Targeted existing buildings	Residential		Non-residential	
	Single-family	Multi-family	Privately owned	Publicly owned
	X			
Budget/source	€27.58M – HRK 207.5M; this is the amount planned per year and funded by the Environmental Protection and Energy Efficiency Fund, the EU Structural Funds, local and regional self-government units and Sources of financing for citizens.			
Administrator	Environmental Protection and Energy Efficiency Fund			
Measures covered	The aim of this measure is to provide financial aid to natural persons investing in the improvement of building energy performance for thermal insulation of envelope elements (walls, roofs, basements), replacement of exterior frames, primarily windows, replacement of existing heating systems with new, more energy-efficient ones, replacement of DHW systems with new, more energy-efficient systems using renewable energy sources.			
Criteria	Priority will be given and/or a higher amount of co-financing will be ensured for projects that achieve a better energy performance than that required by regulations, and to households with older heating or DHW systems, which are approaching the end of their lifespan.			
Programme impacts	It is assumed that 100 family houses per county, or 2,000 houses in the entire country will participate in the programme on an annual basis. Energy savings of 1,412.6 TJ (overall)			

Czech Republic

The Czech Republic is one of the top performers of energy efficiency improvements in Europe. Its success story relies upon building a national consensus on the national and local level about the importance of energy efficiency improvements. A range of different financial instruments have been used throughout the implementation of building improvement measures in the Czech Republic. Some have been part of the NEEAPs, while some have been set up ad hoc, as a result of newly identified priorities, available EU funds and experience gained during implementation. These financial instruments are available at both state and local level and target industry, households, public buildings, energy producers and transmission networks.

The most notable **household programmes at the state level** now are: New Green Savings (*Nová Zelená úsporám*) 2014-2020, Integrated Regional Operational Programme (*Integrovaný regionální operační program*), JESSICA, Programme Panel and Operational Programme "Environment" (*Operační programme Životní prostředí*).

The most significant programmes, in terms of financing, are New Green Savings (with €1bn programmed until 2020), Integrated Regional Operational Programme (€620M) and Operational Programme "Environment" (€370M). These sums are **related to the residential sector** – some of these programmes also support energy efficiency in industry and public buildings.

Programme name	**NEW GREEN SAVINGS** – this is the third instalment of the Green Savings programme			
Start – End Dates	2014-2020			
Type of programme	Subsidies are always paid ex post			
Targeted existing buildings:	Residential		Non-residential	
	Single-family	Multi-family	Privately owned	Publicly owned
	X	X		
Budget/source	€1bn - provided by the State Environment Fund			
Measures covered	Reduction of the energy consumption of existing buildings and family homes (fulfilment of the average heat transfer coefficient of the building envelope, technical supervision); construction of houses with very low energy consumption; efficient use of energy resources (replacement of heat sources with environmentally friendly sources, such as biomass boilers, heat pumps and gas condensing boilers; solar systems, ventilation systems with heat recovery).			
Coverage	Applicable throughout the Czech Republic.			
Scale of support	Depending on the level of reduction, aid of 30%, 40% or 55% of the costs. Depending on the level of consumption of the new buildings, aid of CZK 400,000 or 550,000 (approx. €14,770 or €20,312).			
Programme impacts	Energy savings of 14.31 PJ			

Estonia

Estonia has several types of financial instruments that promote EE in households. These include **preferential loans, grants and tax incentives**. The main mediator for financial measures aimed at energy efficiency of housing is KredEx. KredEx, the Estonian Credit and Guarantee Fund, was established in 2001 by the Ministry of Economic Affairs and Communications with the purpose to improve the financing opportunities of small and medium-sized companies, manage credit risks connected with export, enable people to build or renovate an apartment or house and develop an energy-saving way of thinking, thus changing their behavioural habits towards improved energy efficiency. The grants-based schemes were established in 2003 and are still ongoing. These are: *Support for energy efficient renovation of apartment buildings* and *Grants/subsidies for energy audits*.

Income tax exemption for housing loan interests is a fiscal incentive which exempts interests on loans for home renovation from income tax.

Programme name	**Support for energy efficient renovation of apartment buildings**			
Start – End Dates	2003-ongoing			
Type of programme	Grants			
Targeted existing buildings	Residential		Non-residential	
	Single-family	Multi-family	Privately owned	Publicly owned
		X		
Budget/source	Cohesion Fund			
Measures covered	Works including complete insulation of buildings together with the renovation of boiler rooms and heating equipment within buildings and the construction of ventilation systems with heat recovery.			
Coverage	Country			
Criteria	State programme that supports repair work related to the reconstruction and restoration of apartment buildings.			
Scale of support:	The financing scheme is 15-35% (declining over time) of the cost of the reconstruction work aimed at improving the energy performance of a residential building, and 50% of the cost of preparation of the building design documentation and of the project management and owner's supervision services.			
Programme impacts	Energy savings of 198.5 GWh			

Latvia

Most support measures in Latvia concern the household sector and are provided in the form of **subsidies and/or loans for investments into increasing heat energy efficiency**. Public funding for energy efficiency improvement projects is allocated from the financial resources of the **European Union Structural Funds (ERDF)** and the Cohesion Funds (CF) under the supervision of the Ministry of The Economy (MoE), as well as **the government budget programme**, the Climate Change Financial Instrument (CCFI), under the supervision of the Ministry of Environmental Protection and Regional Development.

The EU programming period of 2014-2020 will be aimed at *Increasing Energy Efficiency in Multi-Apartment Buildings.* Another measure, *Grants for Biomass Heat Technologies in Households*, funded by the ERDF, will support the installation of biomass boilers in 2015 and 2016. Awareness-raising campaigns also contribute to EE in households. A good example of such a measure is the *Dzīvo siltāk!* (Let's Live Warmer!) Information Campaign, which provides educational and consultative services mainly to home owners and residential building companies and raises understanding of EE, resulting in reduction of heat energy consumption. During the first four years, the 186 informative events of different types that had been organised, had more than 8,500 participants.

Programme name	**Increasing Energy Efficiency in Multi-Apartment Buildings: EU programming period of 2014-2020**			
Start – End Dates	2015-2022			
Type of programme	Grants, soft loans, guarantees			
Targeted existing buildings	Residential		Non-residential	
	Single-family	Multi-family	Privately owned	Publicly owned
		X		
Budget/source	€176.47M – provided by ERDF (€150M) and national public financing (€26.471M)			
Administrator	The stock company *Attīstības finanšu institūcija ALTUM* will be responsible for implementation of the given measure/financial instrument.			
Measures covered	Construction works to increase energy efficiency, renovation, reconstruction or establishment of building engineering systems, purchase and installation of heat production sources utilizing renewables, project management, and supervision of construction works.			
Coverage	Aimed at flat owners of residential buildings (community of flat owners of multi-apartment buildings) and occupants in the whole territory of Latvia.			
Scale of support	Financial assistance will be provided in the following forms: • Subsidy (grant) – depending on the energy efficiency level after renovation works; • Repayable loan (up to 20 years) with low interest rates of 2%+12 months EURIBOR) – from ALTUM or other financial institutions; Guarantee for the loan – issued by ALTUM and cover up to 80% of the financial service, the annual premium constitutes 0.65%.			
Programme impacts	The particular measure contributes to achieving a cumulative end-use energy savings target of 1.5%, determined in accordance with Article 7 of the Directive 2012/27/EU. Energy savings of 0.84 PJ			

Lithuania

In Lithuania, financial measures include programmes which involve renovating residential buildings and supporting renewable energy sources in such public buildings, which will contribute to the overall increase of EE in the buildings sector. All programmes are distributed in the form of either **soft loans or subsidies/grants**.

One of the main programmes in Lithuania is the *Programme for renovating (upgrading) multi-apartment buildings,* which is funded by the State and municipality budgets, flat owners' financial resources, EU Structural Funds, and other financial resources. The programme will provide soft loans and grants from 2005 to 2020 for projects related to the modernisation of multi-family houses.

The most recent initiative is the *Modernisation of Multi-family Houses,* financed by the European Union Structural Funds 2014-2020. Other measures include the two-phased *Ignalina program,* realized between 2007-2013 and 2014-2020, and the *Energy efficiency improvement in the household sector,* under the Special programme for climate change that commenced in 2010 and is still ongoing. All of these four measures are grant-based.

Programme name	**Programme for renovating (upgrading) multi-apartment buildings**			
Start – End Dates	2005-2020			
Type of programme	Soft loans or subsidies/grants			
Targeted existing buildings	Residential		Non-residential	
	Single-family	Multi-family	Privately owned	Publicly owned
		X		
Budget/source	Funded by the State and municipality budgets, flat owners' financial resources, EU Structural Funds, and other financial resources.			
Measures covered	Programme for the renovation/upgrading of multi-apartment buildings supports the following activities: • Energy efficiency increasing measures. These are reconstruction and change of heat and hot water supply systems; installation of equipment using renewable energy sources; improvement of heat isolation of pipework; reconstruction of ventilation systems; roof, wall insulation; change of outside doors, windows; modernisation of elevators. • Other measures for house modernisation like reconstruction of other engineering systems (sewage system, electricity installation, drinking water supply system and etc.).			
Coverage	National			
Scale of support	The aim is to ensure financing and implementation of projects related to the modernisation of multi-family houses, to provide soft loans and other state support determined in regulations. • Soft loans with an interest rate of 3%; • Support covering: 100% of renovation project preparation costs, 100% of building maintenance costs, 100% of the project administration costs, 40% of costs for energy efficiency measures, 100% of the project preparation and implementation costs as well as credit and interest to persons entitled to compensation for domestic heating.			
Programme impacts	At present, 58 out of 60 municipalities are participating with 1680 multi-apartment buildings on their lists (the list of municipalities is available at: http://www.lsa.lt/lt/nariai-savivaldybes). By the beginning of 2011, about 3000 individual measures were implemented. Energy savings 200 TJ per year.			

Slovakia

Slovakia maintains a **centralised system of funding, through the State Housing Development Fund**, which was established in 1996. The State Housing Development Fund aims at individuals, households and associations of flat owners and can be used in the form of non-repayable grants or favourable loans in order to improve the thermal insulation of residential buildings and apartments. Significant resources were also withdrawn from the EU structural fund (2007-2013).

In the period 2011-2013, **most of the energy savings were achieved through financial incentives aimed at improving the thermal performance of residential buildings**. In particular, these include the *Government Insulation Scheme* and *SLOVSEFF II*. SLOVSEFF II ended in 2014, but it immediately continued with its next stage *SLOVSEFF III*, which alike its predecessors will aim to promote energy efficiency in buildings, industry and the installation of RES equipment. However, it is not expected to have the same effect on EE, alike the previous two stages, as it will focus more on renewable energy sources projects.

In the upcoming period, other programmes, such as *MUNSEFF* and *JESSICA,* are planned to be finalized, so it will be of utter importance to introduce new financial programmes and instruments aimed at the renovation/construction of residential buildings in Slovakia. This is planned to be done through the European Structural and Investment Funds (ESIF) via the Integrated Regional Operational Programme (IROP 2014-2020).

<table>
<tr><td>Programme name</td><td colspan="4">SLOVSEFF III</td></tr>
<tr><td>Start – End Dates</td><td colspan="4">2014-2016</td></tr>
<tr><td>Type of programme</td><td colspan="4">SLOVSEFF III is a sustainable energy financing facility providing incentive payments and technical assistance for renewable energy, industry EE and residential EE. The incentive payment for residential energy efficiency projects is based on the environmental impact that the proposed measures combined are able to achieve.
Housing associations or cooperatives, private enterprises, energy Service Companies (ESCOs) can apply for this project.</td></tr>
<tr><td rowspan="3">Targeted existing buildings</td><td colspan="2">Residential</td><td colspan="2">Non-residential</td></tr>
<tr><td>Single-family</td><td>Multi-family</td><td>Privately owned</td><td>Publicly owned</td></tr>
<tr><td></td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>Budget/source</td><td colspan="4">Credit lines of up to €40M - Funded by the EBRD in collaboration with the Ministry of Environment of the Slovak Republic and the Ministry of Agriculture, Food and Environmental Affairs of Spain.</td></tr>
<tr><td>Administrator</td><td colspan="4">The SLOVSEFF III participating financial institutions are Slovenská sporiteľňa, a.s. and VÚB, a.s.</td></tr>
<tr><td>Measures covered</td><td colspan="4">Like in SLOVSEFF III, measures include: highly efficient ventilation with heat recovery, urban renewable energy systems such as solar boilers, heat pumps, building-integrated photovoltaic panels, biomass boilers, geothermal and urban wind turbines, efficient boilers, micro-cogeneration, heat substations and heat meters, balancing of heat systems, individual heat consumption measurement systems, new energy-efficient windows (in all apartments of the building), new energy-efficient radiators and other space heating units and insulation of heat and hot water distribution networks.</td></tr>
<tr><td>Coverage</td><td colspan="4">National</td></tr>
<tr><td>Scale of support</td><td colspan="4">• Incentive payments of 5-20% of the disbursed loan amount, subject to project characteristics;
• The maximum budget is €2.5M for residential energy efficiency projects.</td></tr>
<tr><td>Programme impacts</td><td colspan="4">Energy savings of 8.48 TJ (for the period 2017-2020)</td></tr>
</table>

Slovenia

Slovenia has set up a well-balanced package of measures consisting of **grants, preferential loans and information campaigns**. Programmes aimed at raising EE in households are **financed from public funds**. The grants-based measures include: *Financial incentives for energy-efficient renovation and sustainable construction of residential buildings*, *Financial incentives for the energy efficient heating systems* and *Scheme of energy efficiency for low-income households.* These measures will be applied until 2020.

Moreover, *Eco Fund*, the largest financial institution of the Republic of Slovenia, provides a financial incentive which enables **loans of up to €20,000**. The Fund promotes investments that comply with the National Environmental Action Plan and the Environmental Policy of the European Union and is under the jurisdiction of the Ministry of Environment. This incentive commenced in 2011 and is still ongoing.
Finally, an awareness-raising programme *Energy Advice Network for Residents* (*ENSVET*) was launched in 2009 by the Ministry of the Environment and Spatial Planning to advise, inform and assist the citizens (local residents) in the implementation of EE measures in households.

Programme name	**Scheme of energy efficiency for low-income households**			
Start – End Dates	2009-2020			
Type of programme	Grants, subsidies. The financial subsidy is to enable implementation of low investment measures to reduce the energy cost and increase living comfort.			
Targeted existing buildings	Residential		Non-residential	
	Single-family	Multi-family	Privately owned	Publicly owned
	X	X		
Budget/source	€56M - public funds estimated for the period 2011-2016			
Measures covered	The activities include: sanitation of buildings to achieve a minimum of energy efficiency standards, thermal insulation of façades, roofs, project proofing and thermal insulation of critical parts, hydraulic balancing of heating systems and implementation of a system of dividing heating costs, distribution of energy-efficient household appliances, heating systems (especially heat pumps, if the household is heated using electricity), energy efficient lighting and other measures.			
Coverage	National			
Criteria	Aimed at low-income households – households with income in the first quintile.			
Scale of support	Grants/subsidies for implementation of energy efficiency measures, covering 100% of the costs of the investment relative to their appurtenant share of the financing of the investment, while the level of the financial incentive grants for all other investors was up to 25% of the investment costs granted.			
Programme impacts	Energy savings of 98 GWh (in 2020)			

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