

**Residential and Non-residential Building Stock Renovation Strategy, Slovak  
Republic**

Bratislava, July 2014

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## Introduction

The requirement to draw up a strategy for the renovation of residential and non-residential buildings in Slovakia stems from Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC ('Directive 2012/27/EU'), Article 4 of which directs Member States of the European Union to establish a long-term strategy for mobilising investment in the renovation of the national stock of residential and non-residential buildings, both privately and publicly owned.<sup>1</sup>

This strategy should include an overview of the national stock of residential and non-residential buildings, the identification of cost-effective approaches to renovations relevant to the building type and climatic zone, policies and measures to stimulate cost-effective major (deep) renovations of buildings, including staged (deep) renovations. In addition, a forward-looking evidence-based estimate of expected energy savings and other benefits of renovations of residential and non-residential buildings is required to guide the investment decisions of individuals, the construction industry and financial institutions in Slovakia.

The building renovation strategy also includes the obligation imposed under Article 5 of Directive 2012/27/EU. Each Member State shall ensure that, as from 1 January 2014, 3 % of the total floor area of heated and/or cooled buildings owned and occupied by central bodies of state administration is renovated each year to meet at least the minimum energy performance requirements that it has set in the application of Article 4 of Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast) ('Directive 2010/31/EU').

The structure of the building renovation strategy respects the requirements arising from Article 4 of Directive 2012/27/EU, taking into account the related conditions set out in the 'Assistance Documents for EU Member States in developing long term strategies for mobilising investment in building energy renovation (CA EED, CA EPBD and CA RES)'.

## 1. Background and current approach to the renovation of buildings in the Slovak Republic, market characteristics

### 1.1. Current approach to the renovation of buildings

A systemic approach to building renovation was adopted in Slovakia in the late 1990s, when it was found that features common to *buildings older than 30 years* built in Slovakia, for the most part, between 1960 and 1992 in collective forms of construction were the insufficient thermal protection of the structures and the high degree of wear found in the buildings' technical equipment, which needed to be urgently replaced with components of a quality and properties that would create the required safety and well-being in these buildings for an extended period. Another common negative feature comprised the structural and technical shortcomings of building structures, influenced by the initial design solution, the method of implementation, and, in particular, the lack of maintenance and repair.

All of these residential and non-residential buildings, erected according to design documents with substantial levels of repetitiousness, were constructed up to 1992, i.e. they have been in use for over 20 years. This period of occupancy is borne out by the fact that a large proportion of these

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<sup>1</sup> According to Directive 2012/27/EU: residential *and commercial buildings, both public and private*.

structures and technical facilities are approaching the end of their viable life. The need for renovation is also corroborated by changes in legislation and, in particular, technical regulations relating to the essential requirements of structural, fire and user safety, hygiene, health and the environment, as well as acoustic protection, energy savings and thermal protection.

Associated with the renovation strategy are concepts defining the scope of renovation, draft cost-effective measures, and, consequently, the estimated costs and expected energy savings. These concepts are defined in Annex 1.

The Ministry of Construction and Public Works of the Slovak Republic<sup>2</sup> prepared and submitted a Building Renovation Concept with an Emphasis on Housing Stock Renovation, which was approved under Government Resolution of the Slovak Republic No 1088 of 8 December 1999. The scope of residential and non-residential buildings is shown in the following table.

Table 1

Total building stock	Up to 1950	1951 to 1960	1961 to 1970	1971 to 1980	1981 to 1990	1991 to 2000	Total
	built-up volume of buildings (m <sup>3</sup> millions)						
Non-residential buildings	20.95	14.29	22.86	53.33	63.81	34.01	209.25
Residential buildings	44.11	29.52	47.00	88.82	87.51	32.76	329.72
Buildings, halls for manufacturing and services	55.96	41.45	64.28	117.00	143.83	58.11	480.63
Total	121.02	85.26	134.14	259.15	295.15	124.88	1 019.60

Source: Building Stock Renovation Concept with an Emphasis on Housing Stock, Ministry of Construction and Public Works/VVÚPS-NOVA (Surface Structure Research and Development Institute), 1999; amendments for the years 1998–2000 by ÚEOS-Komercia, a.s., Bratislava

According to the Building Stock Renovation Concept, the initial procedural action was to fix systemic defects in multi-family buildings built according to specific types, structural systems and building systems ('structural systems'). The number of systemic defects was extended from the originally proposed six to 11 in 2002, rising to 12 systemic defects in 2006. The second procedural step was to employ renovation as a means of addressing structural, hygienic and user flaws in multi-family buildings more than 30 years old. The third procedural step was to renovate multi-family buildings built in the last 30 years. Government Regulation No 587/2001 amending Government Regulation No 137/2000 on housing programmes, which implemented the Act on the State Housing Development Fund, revised the criterion used to support the renovation of multi-family buildings, bringing the age down from 30 years to 20 years. This also potentially altered the number of dwellings in multi-family buildings built *en masse* which were eligible under the renovation scheme. Besides the age of a multi-family building, scheme eligibility was also contingent on a 20 % reduction in the heat consumed on space heating compared to the original situation.

Financial support for the thermal insulation of buildings was linked to conditions deriving from Resolution of the Government of the Slovak Republic No 493/1991, on the basis of which,

<sup>2</sup> For the Ministry of Construction and the Construction Industry, the Ministry of Construction and Public Works, the Ministry of Construction and Regional Development, the Ministry of Transport, Construction and Regional Development (the 'Ministry').

in October 1991, the Ministry drew up a Directive on Procedures and Specifications for the Additional Insulation and Removal of Faults in Multi-family Buildings.

Since 1996, loans have been available from the State Housing Development Fund for the insulation of residential buildings. The numbers of renovated residential buildings (dwellings) supported under the housing development scheme and the State Housing Development Fund are presented in Annex 2.

The terms and conditions applicable to the State Housing Development Fund's loans for residential building renovation are currently governed by Act No 150/2013 on the State Housing Development Fund (Section 6(1)(c) of the Act). Under that Act, loans are granted for the renovation of residential buildings entailing the modernisation or reconstruction of the common parts of a multi-family building and the common facilities thereof, the removal of a systemic defect in a multi-family building, or structural alterations to a multi-family building or a separately used part thereof or to a single-family building involving the thermal insulation of the external skin and/or roof cladding and the replacement of the original external doors and windows of a multi-family or single-family building ('insulated residential building'). Similarly, insulation loans are granted for the renovation of social service facilities.

Terms and conditions were drawn up as early as 2000 to promote the elimination of systemic defects in multi-family buildings by means of external screen insulation. In the period from 2000 to 2013, 2 630 buildings containing 141 860 dwellings were supported.

Terms and conditions applicable to subsidies for the elimination of systemic defects in multi-family buildings are currently governed by Act No 443/2010 on housing development subsidies and on social housing, as amended by Act No 134/2013.

The launch of action to eliminate systemic defects in the housing stock was a very urgent matter. Financial resources were also gradually released for loans (via the State Housing Development Fund) intended primarily for the renovation of residential buildings. The targeted renovation of non-residential buildings has yet to be started. Structural and private resources were used to cover the partial renovation of selected categories of non-residential buildings.

A common approach to improving the energy performance of buildings in the European Union, and in particular to significantly reducing CO<sub>2</sub> emissions through buildings, was laid down in Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings and Directive 2010/31/EU, which have been transposed into Slovakia's legal and technical regulations. The method for the implementation thereof was addressed initially in the Building Energy Performance Concept up to 2010 with an Outlook up to 2020 (approved under Resolution of the Government of the Slovak Republic No 384/2008) and, subsequently, in the Updated Building Energy Performance Concept up to 2010 with an Outlook up to 2020, approved under Resolution of the Government of the Slovak Republic No 336/2012. The proposed building renovation strategy should serve as an umbrella for many of the new roles stemming from these concepts, currently encompassing the years 2015 to 2020. The results of the scientific and technical service 'Technical and economic aspects of cost-optimal measures to safeguard the energy performance of buildings' will also be used. Those results reflect conditions and procedures under the Commission Delegated Regulation (EU) No 244/2012 of 16 January 2012 supplementing Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings by establishing a comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements, which complements Directive 2010/31/EU.

## 1.2. Background to the renovation of buildings

### 1.2.1. Renovation of residential buildings

Since 1992, Slovakia has targeted the renovation of housing stock which is more than 20 years old, in particular by installing thermal insulation and removing structural deficiencies. The construction of prefabricated multi-family buildings came to an end in 1993. All of these residential buildings should gradually be renovated. This policy is based on the underlying observation that building stock younger than 20 years old undergoes periodic maintenance and upkeep, whereas building stock older than that requires renovation.

The Statistical Office of the Slovak Republic and other institutions have yet to carry out statistical evaluations of individual building works (e.g. the thermal insulation of external walls). Nor does Slovakia engage in the statistical year-on-year monitoring of completed buildings which are being renovated to determine whether they are residential or non-residential buildings. The Statistical Office first addressed building insulation in detail in the 2011 Population and Housing Census. Here, it extended the tracking of building data to include the items 'Thermal insulation' (the insulation of external walls and the replacement of windows) and 'Scope of reconstruction'.

It should be borne in mind that the precision of the data collected is skewed by the way the question has been worded and by the way owners subjectively and individually assess the scope of the renovation or insulation of their building. Data from the 2011 Census (Annex 3) show that 27 % of single-family buildings and 41.04 % of multi-family buildings had been renovated (at least partially) as at 21 May 2011. Compared to multi-family buildings, the figure is unknown for a large number of single-family buildings. This can be explained to some degree by the number of unoccupied flats and houses. While 15 % of single-family houses are unoccupied, the figure for multi-family buildings is just 5.75 %.

The scope of building renovation (insulation) forms a basis for us to compare the results for Slovakia as a whole and also to address regional differences (Table 4, Annex 3). The extent of single-family building renovation is highest in the Bratislava Region (41.86 %) and Žilina Region (33.08 %), and lowest in the Banská Bystrica Region (19.55 %) and Nitra Region (22.97 %). The situation is much the same for multi-family buildings, with as many as 53.13 % renovated in the Žilina Region, followed by 50.25 % in the Bratislava Region, while the Košice Region (31.21 %) and the Nitra Region (32.04 %) languish at the other end of the scale. The almost 20 % regional differences indicate those regions where residential buildings will be renovated at a faster pace and support mechanisms will be sought to plug these region gaps. The expert estimate of building renovation, drawn up by the Building Insulation Civic Association (*Občianske združenie pre zateplovanie budov*) by reference to the progressively updated mechanism detailing thermal insulation installed in the external skin of buildings from 1992 to 2012, can be compared with data from the 2011 Census. The Building Insulation Association's original figures can then be adjusted accordingly (paragraphs 2 and 3 of Annex 3).

Table 2 Dwellings in multi-family and single-family buildings renovated up to 31 December 2013

Description	Dwellings in multi-family buildings	Dwellings in single-family buildings	Total
2011 Census	931 605	1 008 795	1 940 400
Dwellings renovated as at the 2011 Census	392 319	283 415	675 734
Dwellings renovated as at 31 December 2013	469 319	336 415	805 734
<b>Proportion of renovation (%)</b>	<b>50.38</b>	<b>33.35</b>	41.52
Non-insulated housing stock	<b>462 286</b>	<b>672 380</b>	1 134 666

Source: Data from the 2011 Census (Statistical Office), prepared by the Building Insulation Association

Once the Building Insulation Association's figures had been adjusted, it was also possible to calculate the scope of renovation (insulation) for the period from 2011 until the end of 2013. This showed that, taking Slovakia as a whole, half of multi-family buildings had been renovated (469 319 dwellings had been renovated, with 462 286 not renovated), along with a third of single-family buildings (336 415 dwellings in single-family buildings had been renovated, as opposed to 672 380 which had not). We assume that the stated number of renovated single-family buildings and multi-family buildings includes some buildings where only partial renovation has been carried out.

### 1.2.2. Renovation of non-residential buildings

The extent to which non-residential buildings have been renovated has not yet been statistically monitored in Slovakia. This is due in part to the fact that national support schemes to promote the renovation of non-residential buildings have not yet been prepared.

Under the Operational Programme Basic Infrastructure 2004-2006, 178 buildings were renovated, of which 86 were school facilities, 28 were healthcare facilities, 26 were social service facilities and 38 were community buildings. This programme did not specifically focus on building renovation or energy savings.

In 2012, 610 projects under Measure 1.1, Priority Axis 1 Education Infrastructure, of the 2007-2013 Regional Operational Programme were duly completed (506 primary schools, 56 nursery schools and 48 secondary schools); 21 projects were completed under Priority Axis 2 Social Service, Social Protection and Social Care Infrastructure; six projects were completed and 45 were in progress under Measure 3.1, Priority Axis 3 Reinforcement of the Cultural Potential of the Regions and Tourism Infrastructure; and 77 projects were duly completed under Measure 4.2, Non-commercial Rescue Services, Priority Axis 4 Estate Regeneration.

Financial resources disbursed by the Bohunice V1 International Decommissioning Support Fund were used to implement the pilot project 'Energy Efficiency in Public Buildings', under which 57 buildings were renovated (18 nursery and primary schools, 35 municipal authorities and community buildings and four healthcare centres) in the Trnava and Nitra Self-governing Regions. Between 2008 and 2012, the EkoFond supported improvements in the energy performance of 61 school and school-facility buildings and 21 public-service buildings. Between 2005 and 2012, approximately 2 387 500 m<sup>2</sup> of external skin was insulated in the renovation of non-residential buildings.

Energy certificates issued since 2009 offer some indication of the scale of renovation. The central register contains records of energy certificates classified by building category and the energy class achieved. According to the number of energy certificates issued, between 2010 and 2013 a total of 2 337 buildings were renovated, of which 680 were administrative buildings (29.1%),

755 were the buildings of schools and school facilities (32.31 %), 273 were commercial-service buildings (11.68 %), 197 were the buildings of hotels and other accommodation facilities (8.43 %), and 74 were hospital buildings (3.17 %). More detailed results on the number of buildings renovated under energy certificates are presented in Annex 4.

## **2. Underlying background to the public and private building stock renovation strategy (for residential and non-residential buildings)**

### **2.1. Overview of building stock, broken down by category**

Buildings (heated and cooled) have an impact on long-term energy consumption. Buildings account for approximately 40 % of energy consumption. Given the long renovation cycle for existing buildings, new, and existing buildings that are subject to major renovation, should therefore meet minimum energy performance requirements adapted to the local climate.

The results of the statistical processing of the 2001 Census and the 2011 Census, along with the Building Testing and Research Institute (TSÚS) database of residential and non-residential buildings (for the years 1994 to 2003), are the underlying sources for the preparation of the housing stock overview. Information characterising buildings and the heat they consume on space heating can only be accessed from the above database and accounts for a large proportion of the buildings mentioned in the 2011 Census. This information forms a basis when determining the renovation strategy. The construction of buildings built after 2002 should comply with new requirements derived from the revised heat-technology standard STN 73 0540:2002 for structures and buildings. Built-in structures and technical systems have an estimated service life of at least 20 years (for more details, see Annex 5).

#### **2.1.1. Residential buildings**

Residential buildings are divided into multi-family buildings and single-family buildings. Their design and technical solutions are different. As a matter of principle, they differ in size, number of storeys and number of dwellings.

The properties of structures and their share in the overall area of the building envelope are different, resulting in different heat and energy requirements for space heating in these buildings, measured per unit of floor area. The number of existing buildings and their age should be used as factors when determining the potential to reduce energy needs. Construction in individual years of the second half of the 20th century was influenced by the availability of various building materials and structures, and by the controlled construction process using standardised and prefabricated designs.

Table 3 Aggregate data on buildings and dwellings according to the 2011 Census

Description	Single-family buildings	Multi-family buildings	Total
Number of buildings	969 360	64 846	1 034 206
Total number of dwellings	1 008 795	931 605	1 940 400
Number of dwellings occupied	856 147	877 993	1 734 140

Source: 2011 Census, Statistical Office

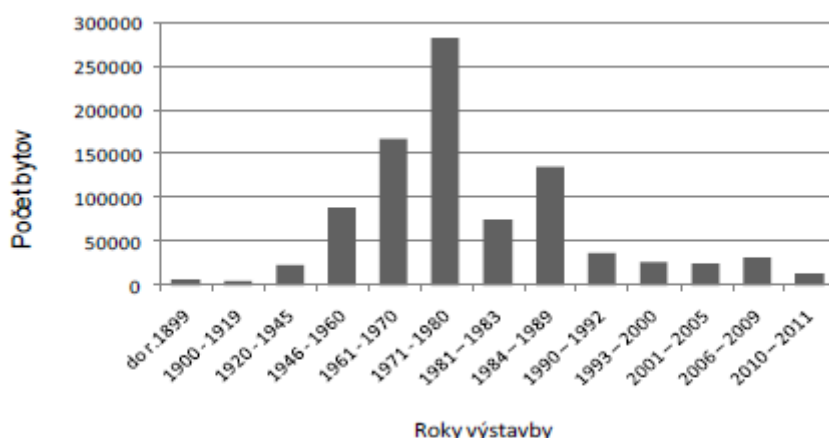


Besides multi-family and single-family buildings, dwellings can also be found in other buildings (religious institutions, social-service buildings, retirement homes, etc.), of which there are 13 020, equating to a 3.41 % share. These buildings accommodate 54 497 dwellings.

Most of this housing stock was built between 1960 and 1983 and is therefore more than 30 years old. Construction work carried out up to 1983 (inclusive) incorporated very poor thermal performance due to the requirements applicable at the time and the technological capacities of construction.

### 2.1.1.1. Multi-family buildings

Multi-family buildings can be characterised by the period in which they were constructed. Between 1947 and 1992, mass housing construction saw the erection of multi-family buildings of various set types, construction systems and structural systems (existing buildings), with a particular inclination for prefabricated concrete technology (large-panel system buildings). After 1992, atypical buildings started to be designed on an individual basis (new buildings). More precise data on the construction of dwellings in multi-family buildings up to 1992 could be drawn from the 2001 Census.



Number of dwellings

Year of construction

Figure 1 – Number of dwellings in multi-family buildings (source: Science and Technology Service – cost-optimal proposals of minimum requirements for the energy performance of buildings, Building Testing and Research Institute)

In view of the thermal performance of the external skin and the construction technology, multi-family buildings can be broken down into five groups which, in the various periods, were influenced by requirements regarding the properties of building structures. These differ by the thermal properties of envelope structures, their share in the surface area of the building envelope, and energy requirements or actual energy consumption.

Table 4 Number of buildings, dwellings, sections and specific area by group (type, construction system and structural system)

Type of structural system, construction system	Number of buildings	Number of dwellings	Number of sections	Total floor area (m <sup>2</sup> )
Brick and pre-assembled masonry panels	6 761	133 814	14 447	10 733 966
Single-layer large-panel system, built between 1955 and 1983	7 983	374 503	20 284	29 807 256
Multi-layer large-panel system, built between 1971 and 1983	2 131	96 298	5 878	8 234 737
Large-panel system, built between 1983 and 1998	3 646	183 402	9 415	16 159 811
Atypical buildings built from 1992	65	996	117	58 776
Other, unspecified	1 137	11 621	2 355	427 121
Total	21 723	800 634	52 496	65 421 666

Source: Slovak Report for the Commission (EU). Reference Buildings. Determination of Cost-optimal Levels of Minimum Energy Performance Requirements, 2013.

Multi-family buildings built up to 2001 can be found in only 567 Slovak municipalities (i.e. in the form of buildings with more than three dwellings). Multi-family buildings constructed *en masse* took the form of terraced houses, slab blocks, point blocks and tower blocks in any of 61 different types, construction systems and structural systems. 43.2 % of dwellings are located in multi-family buildings with up to 4 floors, and only 50 % of dwellings are located in multi-family buildings with more than eight floors. In particular, this results in different renovation costs.

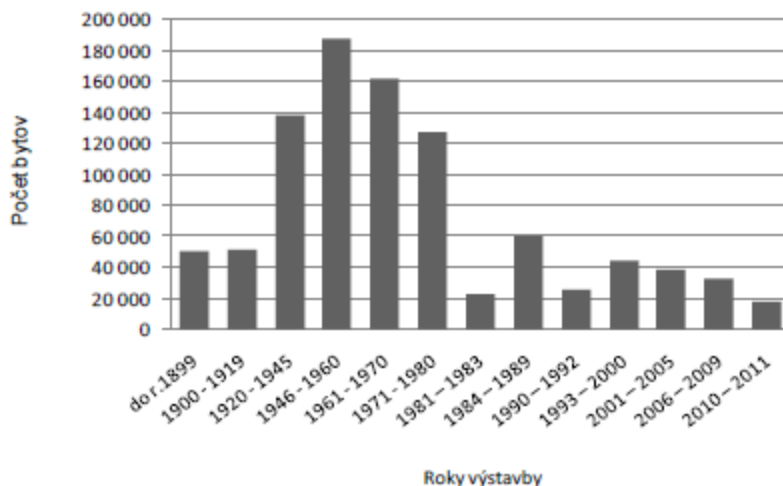
Most multi-family buildings are located in an area with a winter design temperature of -11 °C (308 212 dwellings), -30 °C (163 195 dwellings) and -15 °C (186 437 dwellings). Only 23 multi-family buildings are located in sites with a temperature of -19 °C (274 dwellings). All of the coldest areas where multi-family buildings have been constructed are located in the Prešov and Žilina Higher Territorial Units. Of the 21 723 multi-family buildings, only 1 147 are located at an altitude more than 600 m above sea level and only 175 are at an altitude of more than 800 m above sea level.

The most recent comprehensive surveys show that the average annual heat consumption for space heating between 1994 and 2003 in multi-family buildings was 131.7 kWh (m<sup>2</sup>.a) for buildings made from brick and pre-assembled masonry panels, 110.3 kWh (m<sup>2</sup>.a) for buildings made using single-layer large-panel systems (built between 1955 and 1983), 119.0 kWh (m<sup>2</sup>.a) for buildings made using multi-layer large-panel systems, and 101.9 kWh (m<sup>2</sup>.a) for buildings made using large-panel systems constructed after 1983. The results obtained for buildings constructed after 1983 and up to 1992 were used, following a statistic evaluation thereof, to determine the upper limit of energy class B in the energy performance of buildings in 2006. The actual energy consumed on space heating is influenced by climatic conditions, which can vary significantly in Slovakia. More detailed information on multi-family buildings is presented in Annex 6.

Apertures (building structures with the worst thermal performance) over the building envelope account for a large share of energy consumption. They range approximately from 13 % to 25 % of the overall area of the building envelope and from 19 % to 32 % of the area of the external skin. Apertures in the original construction are a major point of heat loss in a building.

### 2.1.1.2. Single-family buildings

Single-family buildings are variable in their shape, shape factor values and share of individual structures in the thermal envelope. Detailed statistics and databases with data on single-family buildings are not available. Only the number of single-family buildings built in each period, as reported in the 2001 Census and published by the Statistical Office, is available.



Number of dwellings

Year of construction

Figure 2 – Numbers of dwellings in single-family buildings according to statistical data from the 2001 Population and Housing Census, published by the Statistical Office

To determine more detailed typical geometric characteristics of single-family buildings, the set of representative single-family buildings used to determine the scale for the energy certification of buildings in the handling of research and development tasks, as commissioned by the Ministry, could be used as a basis. The habitable areas of single-family buildings are known from the statistics. The ratio between the habitable area and the total floor area varies and depends on the layout of the single-family building. The ratio of the habitable area to the total floor area was set at 75 %.

Table 5 Average size of the habitable area and total floor area of single-family buildings

Single-family buildings Location of dwelling, by storey	Average number of habitable rooms per dwelling	Average habitable area per dwelling (m <sup>2</sup> )	Average adjusted total floor area per dwelling (m <sup>2</sup> )
Ground floor	3.32	60.6	80.8
Ground floor and first floor	4.83	87.4	116.5
First floor	3.53	65.1	86.8
Second floor	4.08	75.2	100.3

Source: Slovak Report for the Commission. Reference Buildings. Determination of Cost-optimal Levels of Minimum Energy Performance Requirements.

Owing to their large envelope area compared to their built-up volume (shape factor), single-family buildings require more heat for space heating than multi-family buildings. The minimum shape factor value for single-family buildings is 0.6 1/m; the maximum value is 1.11 1/m. The total floor area per dwelling in single-family dwellings is approximately 1.5 to 2 times the area per dwelling in multi-family buildings.

No detailed data on the energy consumption of existing single-family buildings is available. Based on the evaluations available, average annual energy consumption on space heating of 165 kWh/(m<sup>2</sup>.a) can be assumed. However, it is not usual for all rooms to be heated at once and therefore the actual energy consumption is lower.

The minimum share of the aperture area is 4.1 %; the maximum is 12.8 %. A large proportion of this is taken up by roof structures, especially in single-family buildings with sloping roofs.

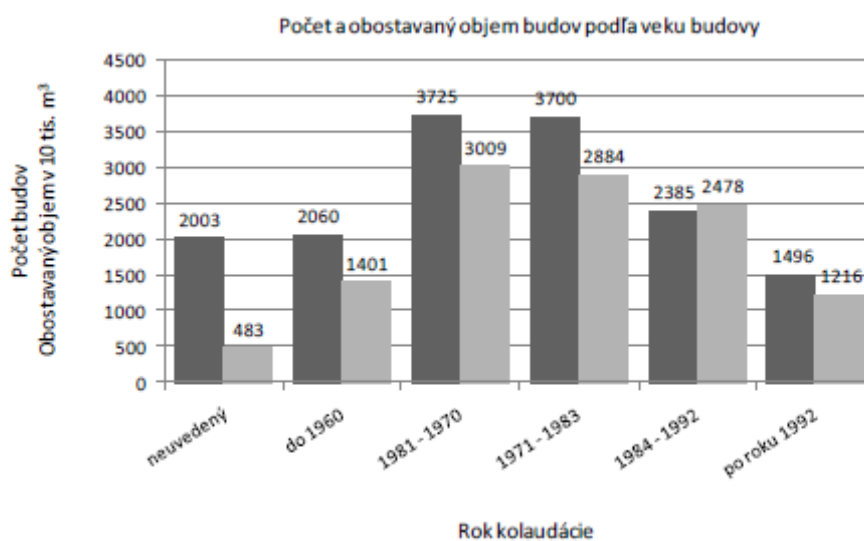
## 2.1.2. Non-residential buildings

### 2.1.2.1. Buildings owned by central and local government bodies

Of the total number of non-residential buildings, between 1994 and 2003, 15 435 buildings were identified as being owned by central and local government bodies. Broken down by built-up volume, 50.9 % of these non-residential buildings were schools, 13.2 % were healthcare facilities, 12.5 % were administrative buildings and 10.3 % were accommodation facilities.

Non-residential buildings owned by central and local government authorities account for a 54.8 % share of the built-up volume of non-residential buildings identified to date (Table 7, Annex 6).

**Number and built-up volume of buildings, by building age**



Number of buildings

Built-up volume (tens of thousands of m<sup>3</sup>)

not specified

Year of final approval

Figure 3 – Built-up volume of non-residential buildings owned by central and local government bodies and number thereof, by age (source: Slovak Report for the Commission (EU). Reference Buildings. Determination of Cost-optimal Levels of Minimum Energy Performance Requirements, 2013)

Information on the average energy consumption on space heating is available only for the period from 1994 to 2003. The average consumption at all non-residential buildings owned by central and local government bodies is 55.2 kWh/(m<sup>3</sup>.a); for primary schools it is only 49.1 kWh/(m<sup>3</sup>.a).

The lower annual heat consumption of primary schools compared with the average for all buildings is due to the lower average temperature of the indoor air in schools, compared, for example, with office buildings or healthcare buildings, and the relatively large number of holidays in the winter. The highest heat consumption is recorded by the buildings of healthcare facilities, i.e. 68.3 kWh/(m<sup>3</sup>.a), and the lowest, at 42.7 kWh/(m<sup>3</sup>.a), is recorded by the buildings of cultural facilities, which are often not heated all year round, and the entire built-up volume is not heated. Sports facilities report low heat consumption at 44.3 kWh/(m<sup>3</sup>.a). These facilities generally comprise the gyms of primary and secondary schools, which are heated to a lower temperature. Average energy consumption on space heating has changed in recent years following the replacement of windows and the installation of insulation. However, in more than a third of buildings arrangements are not in place to reduce space heating at night and weekends.

Besides space heating, most non-residential buildings also use a lot of energy on lighting and hot water. Figures on actual consumption in these areas of energy use are not available.

### 2.1.2.2. Buildings of central bodies of state administration

According to Article 5 of Directive 2012/27/EU, each Member State shall ensure that, as from 1 January 2014, 3 % of the total floor area of heated and/or cooled buildings owned and occupied by central bodies of state administration is renovated each year to meet at least the minimum energy performance requirements that it has set in the application of Article 4 of Directive 2010/31/EU.

Directive 2012/27/EU (Article 5(6)) also allows for an alternative approach to be taken in the fulfilment of the obligation under Article 5(1). This means that a Member State may take cost-effective measures, including renovations and measures for the behavioural change of building occupants, to achieve, by 2020, energy savings in relevant buildings at least equivalent to the volume of savings required in Article 5(1) of Directive 2012/27/EU; Member States are to report on this to the European Commission on an annual basis.

Table 6 Number of buildings, total floor area and built-up volume of buildings of central bodies of state administration (all)

Data	Number of buildings	Total floor area (m <sup>2</sup> )	Built-up volume (m <sup>3</sup> )
Sum of all buildings	3 806	4 773 344	21 678 102
Sum of all buildings, by owner – area not specified	189	0	9 408
<b>Buildings more than 500 m<sup>2</sup></b>	<b>1 893</b>	<b>4 370 709</b>	<b>19 571 523</b>
Buildings more than 500 m <sup>2</sup> , from 1947 to 1993 (inclusive)	1 364	3 175 872	14 026 720
Buildings more than 500 m <sup>2</sup> – year not specified	62	112 392	536 336
Buildings more than 500 m <sup>2</sup> – up to 1947	135	365 202	1 860 893
<b>Buildings more than 250 m<sup>2</sup> (including those more than 500 m<sup>2</sup>)</b>	<b>2 631</b>	<b>4 641 021</b>	<b>21 070 474</b>
Buildings more than 250 m <sup>2</sup> , from 1947 to 1993 (inclusive)	1 938	3 386 048	15 178 299
Buildings more than 250 m <sup>2</sup> – year not specified	1 938	3 386 048	15 178 299
Buildings more than 250 m <sup>2</sup> – up to 1947	192	385 754	1 000 936

Source: Ministry of Transport, Construction and Regional Development – Report notifying an alternative approach in accordance with Article 5 of Directive 2012/27/EU on energy efficiency, Table 2

A list of relevant (eligible) buildings of central bodies of state administration, in accordance with Article 5 of Directive 2012/27/EU, is published on the Ministry's website at <http://www.telecom.gov.sk/index/index.php?ids=82763>.

The notification report informs the European Commission of alternative measures planned in the pursuit of the energy savings target up to 2020 under Article 5(6). The report includes a draft preliminary target in accordance with Article 5(1), a target expressed as energy savings for the purposes of applying the alternative approach, and a list of the alternative measures.

The determining factor in the preparation of the list of buildings for the implementation of the obligation to deep-renovate buildings of central bodies of state administration is a total floor area of more than 500 m<sup>2</sup>. From 9 July 2015, this area will be reduced to 250 m<sup>2</sup>.

The annual target in accordance with Article 5 of Directive 2012/27/EU is 13 374 m<sup>2</sup>, i.e. 3 % of the total floor area of the buildings listed.

## **2.2. Cost-effective approach to building renovation according to the building category and climatic zone**

The proposed cost-effective measures and improvements in the energy performance of buildings will be linked to deep renovations. During deep renovations, attention needs to be paid – in addition to building stock structures and their major renovation (improvements in the thermal protection of structures) – to the major renovation of buildings' technical systems, i.e. the space heating system and hot water system for residential and non-residential buildings, as well as the ventilation, cooling and lighting of non-residential buildings.

Improvements in the energy performance of buildings are also dependent on the energy efficiency of heat and cold production. Slovakia has a well-developed district heating system that covers more than 30 % of overall heat consumption (approximately 16 100 multi-family buildings). Most heat sources and heat distribution systems were built prior to 1990. The boilers used in district heating systems vary considerably in terms of their age, technical parameters and fuel type. Most of the boilers in operation are less than 15 years old. Installed capacity is dominated by boilers more than 20 years old. District heating systems tend to use warm water and hot water distribution systems. Most heat distribution systems are between 20 and 30 years old, and their technical condition reflects this. As the expected service life of these sources and distribution systems is between 20 and 25 years, the major renovation of technical equipment also encompasses heat and hot water production and distribution.

Deep renovation may be carried out as partial measures, in the form of gradual steps, or separately as the major renovation of a building (structures) and the major renovation of technical systems. Deep renovation may also encompass all measures at once.

Draft measures are differentiated by:

- a) the targets set to ensure the energy performance of buildings, as laid down by Act No 555/2005 on the energy performance of buildings, as amended by Act No 300/2012 and Implementing Decree No 364/2012;
- b) the building category (residential and non-residential buildings);
- c) the construction period (up to 1983, inclusive, up to 2002, after 2002);
- d) the original condition of structures (apertures, external skin, roof cladding and internal partitions between heated and non-heated rooms);
- e) the original condition of technical systems in the building (space heating, hot water,

ventilation, cooling, lighting);

f) the age and technical condition of sources of heat, hot water, cold and distribution systems in and outside of the building;

g) the extent to which renewable sources of heat, hot water and electricity have been introduced.

The proposed cost-effective measures and improvements in the energy performance of buildings are detailed in Annex 5.

Procedures for the evaluation of cost-effectiveness are laid down in the standard STN EN 15 459. These procedures were also applied when determining the cost-optimal levels of the minimum requirements for the energy performance of buildings in accordance with Commission Regulation (EU) No 244/2012. When calculating the net present value during the expected economic cycle, it is necessary to determine the initial investment costs of implementing the measures and to set the calculation period and the life of the individual measures (components), the replacement costs, the costs of maintenance and economic activities, disposal costs, and the cost of heat, electricity and other energy carriers.

To maintain the cost-optimal level of minimum requirements for the energy performance of buildings, it is necessary to ensure that the greater stringency envisaged from 1 January 2016 takes effect. This was reported to the Commission in May 2014 and is published at [http://ec.europa.eu/energy/efficiency/buildings/doc/sk\\_cost-optimal\\_2013](http://ec.europa.eu/energy/efficiency/buildings/doc/sk_cost-optimal_2013).

### **2.3. Procedures and measures to promote cost-effective deep renovations**

The Ministry has prepared a National Plan to Increase the Number of Nearly Zero-energy Buildings (the 'National Plan'), designed to ensure that new construction after 2020 is of the required standard. The National Plan has been published on the Ministry's website at <http://www.telecom.gov.sk/index/index.php?ids=83491>.

Interim targets to achieve the individual energy levels of construction have been laid down in Implementing Decree No 364/2012 implementing Act No 555/2005 on the energy performance of buildings and amending certain laws, as amended, encompassing three stages as follows:

- a) the low-energy level of construction for new and renovated buildings from 1 January 2013, equal to the upper limit of energy class B for the individual building categories;
- b) the ultra-low-energy level of construction for all new buildings from 1 January 2016, equal to the upper limit of energy class A1, and for renovated buildings, assuming compliance with cost-effectiveness conditions;
- c) the energy level of nearly zero-energy buildings for new buildings owned and managed by public entities from 1 January 2019, and all new buildings from 1 January 2021, equal to the upper limit of energy class A0 for the overall indicator (primary energy). This energy level is also required, where technically, functionally and economically feasible, for renovated buildings.

The heat required for space heating has a significant influence on space heating energy requirements and hence on the overall energy needs of a building. The heat required for space heating depends on the efficiency and quality of a building's thermal protection. Standard STN 73 0540-2:2012 defines requirements for energy-efficient buildings (the maximum permitted values guaranteeing compliance with hygiene criteria), low-energy buildings (standardised requirements from 1 January 2013), ultra-low-energy buildings (recommended values, applicable as standardised from 1 January 2016) and nearly zero-energy buildings (target recommended values, applicable as standardised from 1 January 2021). Thermal protection is

essential to safeguard the necessary level of construction in terms of energy requirements.

New buildings must comply with standardised requirements for the thermal performance of structures and buildings. Buildings undergoing major renovation must also comply with standardised requirements. Where this is not functionally, technically or economically feasible, all structures subject to major renovation must at least meet the minimum requirements for energy-efficient buildings.

If a nearly zero level of energy requirements is to be achieved for all new and renovated buildings, renewable energy sources must be used efficiently in buildings. Accordingly, it is advisable to promote lower-capacity sources in the future.

The cost-optimal levels of minimum requirements for the energy performance of buildings were laid down in the Commission's comparative methodology framework established by Commission Regulation (EU) No 244/2012 and the Guidelines accompanying Commission Regulation (EU) No 244/2012, supplemented with national parameters. The objective pursued in the handling of the scientific and technical service was to prove, by means of calculations and comparisons, whether the current requirements for the minimum energy performance of buildings and building elements in Member States lag far behind the cost-optimal requirements. The results of a comparison show the merits of tightening requirements after 2015 to 50 % of the current level of requirements (Annex 7).

## **2.4. Expectations and scope of renovation of residential and non-residential (public and private) buildings after 2013 to guide the investment decisions of individual investors, the construction industry and financial institutions**

### **2.4.1. Scope of residential building renovation expected after 2013**

Assuming financial resources are secured at the same level as in previous years (approximately EUR 100 million per year), materials and staffing are in place to continue building renovation at the same pace as in the last five years.

The need to ensure more stringent energy levels of construction will also increase demands on the quality of work related to the energy performance of buildings. Based on experience to date and on adequate forms used to promote the renovation of residential buildings, projections indicate that such renovation should continue at an annual tempo of 29 000 dwellings in multi-family buildings and 22 000 dwellings in single-family buildings. The renovation of such a number of dwellings should have covered, in 2020, 72.38 % of multi-family buildings and 48.81 % of single-family buildings.

At this rate of renovation, multi-family buildings in Slovakia should be renovated in 2029, and single-family buildings in 2043. If we were to limit our forecasts solely to the renovation of occupied single-family buildings, their renovation could be completed in 2036.

More stringent requirements require the re-renovation of buildings already renovated in the past (the doubling of thermal insulation and the replacement of windows).



Table 7 Scope of residential building renovation expected after 2013

Description	Dwellings in multi-family buildings	Dwellings in single-family buildings
2011 Census	931 605	1 008 795
Renovation as at 31 December 2013	469 319	336 415
<b>Proportion of renovation as at 31 December 2013 (%)</b>	<b>50.38</b>	<b>33.35</b>
Scope of renovation in 2014-2020	203 000	154 000
Scope of renovation as at 31 December 2020	672 319	490 415
<b>Proportion of renovation as at 31 December 2020 (%)</b>	<b>72.15</b>	<b>48.61</b>
Balance for 2021-2030	259 286	518 380
Number of years of renovation after 2020	8.84	23.56
Renovation of occupied dwellings in single-family buildings after 2020		<b>15.44</b>

Source: Data from the 2011 Census (Statistical Office), prepared by the Building Insulation Association

#### 2.4.2. Scope of non-residential building renovation expected after 2013

As the total floor area of the buildings of central bodies of state administration is 445 791 m<sup>2</sup> and every year 3 % needs to be renovated, 13 374 m<sup>2</sup> (Annex 2 of the Notification Report) should be renovated, and the saving should be 52.17 GWh/year.

#### 2.5. Evidence-based estimate of expected energy savings and other benefits

The potential for overall energy savings in residential and non-residential buildings up to 2020 was first determined in the updated Building Energy Performance Concept up to 2010 with an Outlook up to 2020, approved under Resolution of the Government of the Slovak Republic No 336 of 6 July 2012. The potential for energy savings anticipated an increase in the non-residential buildings renovated up to a level of a 3 % share of the total floor area of such buildings per year. The fact that the scope of energy savings will be positively influenced by the future renovation of non-residential buildings at a low-energy and ultra-low-energy level was taken into account. The energy-saving potential in the period from 2011 until 2020, if the proposed measures were implemented for residential and from non-residential buildings, should have resulted in total energy savings of 15 222.8 TJ.

The conditions for determining the energy-saving potential were changed. The energy-saving potential determined for the years from 2014 to 2016, with an outlook until 2030, is based on measures proposed by the Ministry in the preparation of the third Energy Efficiency Action Plan for 2014-2016 with an Outlook until 2020 (the 'action plan'). The energy-saving potential from the renovation of residential and non-residential buildings up to 2030, established in this manner, is presented in Annex 8. The projected energy savings are 6 928.6 GWh.

### **3. Mobilisation of investment in public and private building stock renovation (for residential and non-residential buildings)**

#### **3.1. Existing forms of building support**

##### **3.1.1. Existing forms of residential building support**

State housing policy concepts adopted after 1990 regulated an unequivocal task in housing quality: to improve the technical condition of the existing housing stock and, using appropriate renovation instruments, to contribute to the extended service life thereof and to enhancements in the energy performance of buildings. These state housing policy concepts paved the way for the Building Renovation Concept with an Emphasis on Housing Stock Renovation, which was adopted as early as 1999 and has remained in force since. This concept systemically addressed housing stock renovation to safeguard the housing policy concept's residential and non-residential building targets.

In order to expand and enhance housing stock, in its housing policy the state currently employs a system of economic instruments in the form of direct and indirect aid.

a) **Direct state aid** for tasks associated with building renovation is provided in the following form:

- direct subsidies under a housing development scheme, granted by the Ministry to eliminate systemic defects in multi-family buildings;
- soft loans granted to natural persons and legal persons via the State Housing Development Fund, subject to compliance with statutory conditions.

b) **Indirect state aid act** is available:

- under the Housing Stock Renovation State Aid Scheme, in the form of bank guarantees for loans (the 'bank guarantee scheme'), which was approved by the Slovak Government to revive housing construction and foster conditions conducive to the renovation of housing stock;
- as mortgage financing, where state aid is provided in the form of a state contribution to mortgages or a state contribution to mortgages for young people (this is only available for natural persons);
- under a system of state-subsidised building society savings, where state aid takes the form of a state premium added to the building society savings of natural persons and associations of the owners of dwellings and non-residential premises.

The results of state aid for the renovation of housing stock can be summed up as follows:

a) In the period from 2000 to 2013, subsidies totalling approximately EUR 101 716 000 were granted to eliminate systemic defects in multi-family buildings with 141 860 dwellings.

b) State Housing Development Fund resources were provided:

1. for residential building renovation in the period from 1996 to 2013 in the total amount of EUR 387 147 000, of which EUR 374 166 000 comprises support for multi-family buildings (94 018 dwellings) and EUR 12 981 000 is support for 2 091 dwellings in single-family buildings.
2. for residential building insulation from 2009 until the end of 2013 in the amount of EUR 132 530 000, of which EUR 131 650 000 was channelled into 29 985 dwellings in multi-family buildings and EUR 879 000 comprised support for 51 dwellings in single-family buildings.

c) Between 2000 and 2013, bank guarantees were granted for loans totalling EUR 43 019 000, intended for 26 852 dwellings.

d) In the building society savings system, building societies grant approximately 80 % of

financial resources for the renewal of housing stock; expressed financially, this translates into approximately EUR 280 million per year. Minor measures for the modernisation and reconstruction of multi-family and single-family buildings account for approximately 56 %.

Information on direct aid for the renovation of residential buildings, as presented in Annex 2, highlights the fact that building owners are aware of the need to eliminate systemic defects prior to the renovation of the building itself or as an initial step in the renovation process, as evidenced by the share of dwellings in which systemic defects have been removed (141 860 dwellings). In the period from 1996 to 2013, EUR 519 677 196 in aid was granted for the further renovation of housing stock, comprising 126 125 dwellings.

One particular area where aid for residential building renovation and residential building insulation has so far proved to be of little effect is single-family buildings, the number of which receiving support accounts for under 2 % of all dwellings renovated. The form of support and the conditions thereof for the renovation of insulated buildings, intended to increase interest in the use of such support among single-family building owners, have failed to make these new types of aid – introduced in 2009 – more popular. Of the single family buildings insulated thus far, estimated to be more than 338 000, only 0.6 % has been renovated with the use of financial support from the state.

In this light, the forms of state aid intended for single-family buildings need to be revised as a matter of principle. It should be borne in mind that the area of envelopes and apertures (the external skin and roof, as well as windows), on a per-dwelling basis, is at least four to six times larger; while this requires a larger proportion of aid, it results in greater energy-saving benefits per dwelling and, as such, the proportion of CO<sub>2</sub> emission reductions per dwelling is higher.

### **3.1.2. Existing forms of non-residential building renovation support**

The support for residential building construction has not been mirrored by national support schemes for the financial support of non-residential buildings in Slovakia.

Information published in the Building Energy Performance Concept up to 2010 with an Outlook up to 2020, approved under Government Resolution No 384 in 2008, indicates that a major step forward in the renovation of non-residential buildings was taken by the implementation of the Operational Programme Basic Infrastructure, especially Priority 3 thereof (Local infrastructure for 2004-2006). The financial resources released, amounting to SKK 1 872 258 937 (EUR 62 147 611), contributed to the renovation of 178 buildings, of which 86 were school facilities, 28 were healthcare facilities, 26 were social service facilities and 38 were community buildings. The required monitoring of information did not focus on measures geared towards energy savings and, hence, the reporting of benefits delivered by improvements in the energy performance of buildings.

Under a grant agreement signed in 2008 between the Ministry of Economy of the Slovak Republic, the European Bank for Reconstruction and Development and the Slovak Innovation and Energy Agency, other programmes were used to implement the pilot project 'Energy Efficiency in Public Buildings', under which 57 buildings were renovated (18 nursery and primary schools, 35 municipal authorities and community buildings and four healthcare centres) in the Trnava and Nitra Self-governing Regions. The Bohunice V1 International Decommissioning Support Fund provided financial resources.

Financing for the energy performance of buildings from the private sector was provided by EkoFond between 2008 and 2012; this primarily took the form of financial support for municipalities as the founders of school and school facilities or social, healthcare and cultural facilities. As such, EkoFond contributed to improvements in the energy performance of buildings at 61 schools and school facilities and 21 community buildings by providing support of EUR 3 996 968. In addition, a programme call in 2008 supported energy measures implemented at another 34 single-family and eight multi-family buildings at a cost of EUR 597 457.

At an estimate, the energy performance of more than 300 non-residential buildings was supported. This remains a very low proportion, with no focus on achieving major energy savings in buildings. Neither the established conditions nor projects were rigorously centred on achieving applicable minimum requirements for the energy performance of buildings, and therefore the buildings renovated so far fall short of the criterion of major renovation.

The forthcoming project Energy Audits, for more than 250 buildings owned or managed by organisations throughout Slovakia funded fully or partly from the public purse, aims to analyse the potential for savings and propose specific measures to reduce energy consumption in public buildings.

This project is financed by the Structural Funds via the current Operational Programme Competitiveness and Economic Growth (2007-2013). Municipalities, towns, higher territorial units and state institutions will be able to use the processed audits in the preparation of projects to finance measures proposed under support mechanisms in the 2014-2020 programming period.

### **3.2. Requirements concerning the forms of residential and non-residential building support from 2014**

The strategic objective pursued by energy policy in Slovakia is to achieve a competitive low-carbon energy industry delivering the safe, reliable and efficient supply of all forms of energy at affordable prices, with due consideration for consumer protection and sustainable development. The deep renovation of residential and non-residential buildings paves the way for low-carbon energy, but requires sufficient motivation among the owners of residential and non-residential buildings – with effective forms of financial support for the renovation of buildings – in order to meet stringent minimum requirements for the energy performance of buildings which also deliver the required economic returns.

#### **3.2.1. Requirements concerning the forms of residential building support from 2014**

In the preparation of the State Housing Policy Concept up to 2020, a priority task in the renovation of housing stock remains enhanced housing quality with the improved energy performance of buildings, and hence the extended life of residential buildings.

In the renovation of buildings, it is necessary to take into account the need to exploit the full cost-effective potential of energy savings for a particular building, while bearing in mind the long cycle of renovation, and, therefore, to engage in comprehensively major renovation at the time such renovation is essential. Such major, or deep, renovation should also factor in the efficient use of renewable energy sources.

For financing purposes, in the forthcoming period more use will have to be made of sources from the European Union's Structural Funds in the form of grants (by implementing the JESSICA

initiative under the Regional Operational Programme and the Operational Programme Bratislava Region) because the implementation of measures focusing on improved energy efficiency contributes directly to the pursuit of one of the main Europa 2020 objectives. There are plans to use resources from the Integrated Regional Operational Programme 2014-2020 (within the scope of Priority Axis 4 Improvement in the quality of life in regions, with an emphasis on the environment, Investment Priority 4.1: Support of energy efficiency, smart energy management and the use of energy from renewable sources in public infrastructure, including public buildings, and in the housing sector) for the renewal of residential buildings, with an overall allocation of EUR 111.4 million (EU source), of which EUR 101.4 million is earmarked for less-developed regions and EUR 10 million for a more developed region.

Another major source, apart from the central government budget, will comprise the use of resources from the sale of CO<sub>2</sub> emissions, where the renovation of buildings is one of the most significant sources of CO<sub>2</sub> reductions and, therefore, proof of effective use in the investment of these resources. The completed renovation of each residential building (multi-family or single-family building), by means of the energy certificate delivered upon final approval, can serve as proof not only of savings in overall energy, but also the scope of CO<sub>2</sub> emission reductions.

SLOVSEFF III (Slovakia Energy Efficiency Finance Facility) projects are being prepared, involving plans to support the energy efficiency of buildings and the promotion of renewable sources by the EBRD.

We expect the system of economic instruments currently in use, in the form of direct and indirect aid as presented in Section 3.1.1, to be continued in national support for the renovation of residential buildings after 2014. The gradual tightening of conditions required to achieve more demanding energy levels of construction must be reflected in revised requirements for the granting of the corresponding financial support.

At present, the estimated absorption capacity for improvements in the thermal performance of the structures of housing buildings and the modernisation of buildings' technical equipment is expected to comprise between EUR 250 million and EUR 350 million from public resources (the Ministry of Transport, Construction and Regional Development, the State Housing Development Fund) for the 2014-2020 period, which is insufficient. Approximately EUR 110 million needs to be earmarked from public resources every year to cope with the projected rate of renovation of multi-family buildings in Slovakia not only up to 2020, but beyond – up to 2030. Therefore, only around two thirds of the financial resources required to renovate 29 000 dwellings in multi-family buildings every year will be covered. It follows that the gap in funding will have to be secured from other sources, e.g. by drawing on financial resources from European funds, building societies, commercial banks and other avenues open to the owners of dwellings.

Annex 2 shows that the overall scope of support, if a subsidy covering 30 % of eligible costs per renovated dwelling in a single-family building were to be applied (capped at EUR 6 000), would be reduced to a third for single-family buildings compared to the need for credit facilities.

At the same time, this will build a stairway to realistic future energy savings and reduced emissions as a result of renovated single-family dwellings; this is one of the greatest energy saving potentials in Slovakia in the future. Many related deficiencies in single-family buildings would also be addressed by appropriate incentives to renovate such buildings:

1. single-family buildings built prior to 1992 were generally self-help, unskilled projects with numerous errors in design and construction;
2. today, the renovation of single-family buildings is often not carried out on the basis of a

- building permit, the necessary design documentation is not drawn up, and energy certificates are not submitted (in the reporting period from 2010 to 2013, energy certificates were issued for only about a tenth of the single-family buildings renovated);
3. the thermal protection of single-family buildings is not addressed sufficiently, crucial details are not covered by design documentation and, hence, in construction, thermal bridges are created; heat is leaked and hygiene deficiencies arise;
  4. many single-family buildings are only partially insulated, and energy certificates for the years from 2000 to 2013 prove that many such buildings, even today, are only renovated in energy classes D, E or F;
  5. there is scrimping on materials, frequently unsuitable construction products are used, and the components of external thermal insulation composite systems (ETICS) are replaced with others.

### **3.2.2. Requirements concerning the forms of non-residential building support from 2014**

In the long run, the European Union's Structural Funds are a fundamental source of financing for the development of Slovak businesses' competitiveness and the attainment of a competitive low-carbon energy industry; this also applies to the renovation of non-residential buildings. There are plans to make use of the Structural Funds, in particular via the Operational Programme Quality of the Environment and the Integrated Regional Operational Programme 2014-2020. Under the Environmental Fund, in order to make use of proceeds from the sale of emission allocations, the specification of subsidy-related support activities for 2014 was extended to include improvements in the energy efficiency of existing public buildings, including insulation. This support encompasses the buildings of primary and secondary schools, nursery schools/preschool facilities, community centres and municipal authorities in the competence of municipalities, local government bodies, and their facilities.

In Member States of the European Union, the renovation of public buildings and, in particular in this respect, the renovation of the buildings of central bodies of state administration, should serve as an example for non-residential buildings. There are plans to achieve the energy savings target set for the purposes of the alternative approach under Article 5 of Directive 2012/27/EU by means of the following measures:

- a) Increased energy efficiency in public sector buildings;
- b) Energy auditing for public sector buildings or energy management;
- c) Measures designed to change the behaviour of the occupants of buildings of central bodies of state administration – the provision of advisory services, information and training activities aimed at public sector buildings and the provision of energy management.

These measures are specified in more detail in Table 8, employing the relevant sources of the European Union's Structural Funds.

Based on the structuring of the financial plan for the Operational Programme Quality of the Environment, approved under Resolution of the Government of the Slovak Republic No 175 of 16 April 2014, European Union sources amounting to EUR 886 901 768 and national co-financing of EUR 664 672 193 (a total of EUR 1 551 573 961) are being considered for less-developed Slovak regions under Priority Axis 4, Thematic Objective 4 Energy-efficient low-carbon economy in all sectors. The national co-financing for the more developed regions of Slovakia is EUR 3 984 712 (a total of EUR 7 969 424).

It follows from the above document that spending of approximately EUR 890 million is projected for measures focusing on increased energy efficiency in Slovakia in the 2014-2020 programming

period. Under the Operational Programme Quality of the Environment, financial resources earmarked for the renovation of public buildings outside the Bratislava Region amounting to between EUR 350 million and EUR 370 million may be spent on proposed energy efficiency measures at central bodies of state administration as part of the mandatory renovation of those bodies' buildings. Following the exhaustion of financial resources for the renovation of the buildings of central bodies of state administration outside the Bratislava Region, at present there is no supporting financial mechanism to facilitate the financing of the annual renovation required in the Bratislava Region.

Under the performance framework of Priority Axis 4 of the Operational Programme Quality of the Environment, the output indicator, as a milestone for 2018, is the renovation of 123 public buildings; the ultimate target is 550 buildings in 2023. Every year, 13 374 m<sup>2</sup> of the total floor area of the buildings of central bodies of state administration should be renovated, and all measures referred to in Table 8 should be financed.

Table 8 Alternative energy efficiency measures – activities planned for the individual measures

Measure	Title of programme/mechanism	Specification	Activities
a. Increased energy efficiency in public sector buildings	Operational Programme Quality of the Environment, Priority Axis 3.	Thematic Objective 4: Support of the transition to a low-carbon economy in all sectors; 3. Support of energy efficiency, smart energy management and the use of energy from renewable sources in public infrastructure, including public buildings, and in the housing sector	A. Improvement in the energy efficiency of public administration buildings (central and local government buildings): a. Improvement in the thermal performance of structures; b. Modernisation of heating/air conditioning systems, hot water systems, and lighting to reduce energy intensity; c. Installation of measurement and management systems; d. Change in the heat supply method to exploit efficient district heating systems
	Mechanism to promote energy efficiency	Energy efficiency measures in buildings of central bodies of state administration in the Bratislava Region	a. Improvement in the thermal performance of buildings of central bodies of state administration b. Improvement in the efficiency of the technical equipment of state administration buildings
b. Energy auditing for public sector buildings	Operational Programme Competitiveness and Economic Growth	Energy audits	a. Energy auditing and the implementation of low-cost measures in public administration buildings outside the Bratislava Region
	Ministry of Economy, budget headings of the relevant central bodies of state administration	Pilot project: Energy audits in the buildings of central bodies of state administration	a. Energy auditing and the implementation of low-cost measures in buildings of central bodies of state administration in the Bratislava Region
c. Measures designed to change the behaviour of the occupants of buildings of central bodies of state administration	Operational Programme Quality of the Environment, Priority Axis 3.	Measures designed to change the behaviour of the occupants of buildings of central bodies of state administration	a. Raising of energy-related awareness for central bodies of state administration, including advisory services, information campaigns, training, expert seminars, etc.
			b. Monitoring of energy consumption and energy savings in buildings of central bodies of state administration

Source: Table 5 of the Report notifying an alternative approach in accordance with Article 5 of Directive 2012/27/EU on energy efficiency, Ministry of Economy

Besides opportunities to make use of European Union resources, it is also essential to learn about the offers of European banking institutions in good time. One is the MUNSEFF (Municipal Energy Efficiency Finance Facility) project. The SLOVSEFF project is also expected to continue.

MUNSEFF is a credit facility to support the development of energy efficiency and renewable energy sources among towns and municipalities in Slovakia. This support is provided by the European Bank for Reconstruction and Development. The programme is implemented in Slovakia by Slovenská sporiteľňa, a.s. and Všeobecná úverová banka, a.s.

The MUNSEFF programme enables applicants to receive a grant covering part of the loan principal; the amount of the grant depends in part on the scope of the project or the amount of energy saved. Under the MUNSEFF programme, multi-family buildings with renovation projects aimed at increasing energy efficiency may apply for soft loans, grants or the free assistance of a design consultant.

The minimum loan per project is EUR 20 000; the maximum loan is EUR 850 000. Upon the successful completion of project implementation, a multi-family building may obtain a grant covering between 10 % and 15 % of the overall loan. One of the requirements is the attainment of energy savings of more than 30 % compared to the situation prior to project implementation. Eligible applicants are municipalities, companies majority-owned by municipalities, and private companies providing public services, e.g. theatre or swimming pool operators. Resources may be granted for projects on the energy efficiency of municipality-owned buildings (e.g. offices, health care, education, culture, sport and relaxation, catering services, etc.). The eligible groups of measures are:

1. Renovation of the space heating system, replacement of boilers, installation of heat exchanger stations, modernisation of mechanical equipment (heaters, pumps, heat recovery);
2. Replacement of windows and doors (transparent building apertures) for more energy-efficient versions;
3. Thermal insulation of buildings (exterior walls, roof and ceiling of the service floor);
4. Renovation of lighting;
5. Installation of solar thermal panels.

#### **4. Tasks for the construction industry, the business community, employment and improved qualifications arising from the strategy**

Residential and non-residential building renovation stakeholders are central bodies of state administration, local government bodies, private owners as investors (including those represented by facility managers), manufacturers of construction materials and the technical equipment systems of buildings, designers (architects and civil engineers, represented by professional organisations), contractors (represented by employer associations and industry networks), and research and development centres.

New tasks associated with the renovation strategy for investors and designers are incorporated into the strategy's conclusions.

The aim of BUILD UP Skills – Slovakia (BUSS) was to prepare the initial steps of a national



strategy to improve training in construction with a specific focus on future construction site specialists so that Slovakia and Europe would be able to meet the challenges of a ‘green economy’, i.e. energy efficiency (reduced energy consumption), the use of renewable energy sources, and reductions in greenhouse gas emissions, and, consequently, to meet the 20/20/20 targets by 2020.

Employee skills, training and expertise are currently regarded as key attributes in the further development of the construction industry. In construction, as in many other sectors, increased productivity at all levels hinges on the skills of those in the industry.

In general, the manual skills of workers in the Slovak construction industry are thought to be very good, and the professional reputation enjoyed by Slovak workers has also spread abroad. The working morale of blue-collar professions, however, is much worse.

In the wake of transformation, the Slovak construction industry established the organisational structure commonly used in other countries. A natural hierarchy of small (up to 49 employees), medium-sized (up to 250 employees) and large (over 250 employees) enterprises was formed, the organisation of which mirrors the structure of contracting and demand. Self-employed persons, i.e. sole traders, in the construction industry form a distinct group in this respect. Each of these groups has found its natural place in the construction market.

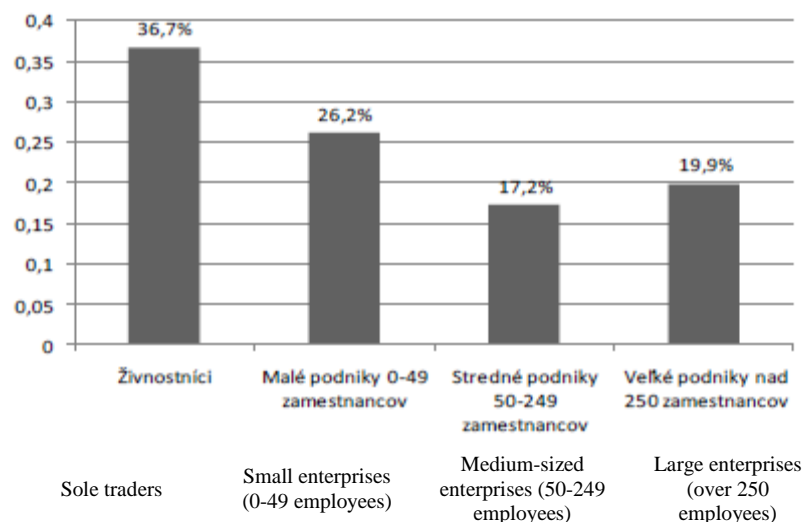


Figure 4 – Structure of construction output by business entity – 2012. Source: Ročenka slovenského stavebníctva 2013 (2013 Slovak Construction Yearbook). ÚEOS-Komerčia, a.s./Ministry of Transport, Construction and Regional Development

Based on their experience of the existing quality of work, employers project that, on average, 31 % of their employees and 43 % of the employees of their subcontractors will require additional training in the pursuit of professions related to deep renovations of the existing stock of residential and non-residential buildings. In other words, with an average of 165 254 employees in the construction industry, almost 80 000 will need training.

Obstacles hindering progress towards the targets set up to the year 2020 have been identified in two areas. The first area comprises barriers related to primary education and training. The second area comprises barriers in the current construction market that also reflect current macroeconomic, sociological and demographic circumstances because all of these help to form the construction environment.

It is estimated that at least 40 % of building construction workers will need to undergo training, take a course or otherwise improve their skills in the next few years.

A worker who has undergone training and embraced environmental changes can be regarded as a representative of a green profession. Green professions include the following expert areas of employment: bricklayers, decorators, roofers and building structure assemblers – responsible for construction work related to the insulation of the external skin and roof cladding, and the installation and replacement of windows and doors, electricians – who install solar panels, plumbers – who install solar collectors for hot water, construction workers – who build energy-efficient buildings and wind power stations, and other workers involved in the sustainable development of the clean and renewable energy of the future, as well as specialists in verifying the functionality of energy-efficient building systems and facility managers of energy-efficient buildings. These are professions associated with the sector responsible for reducing energy consumption in buildings and for the use of renewable energy, and with energy efficiency.

Schools do not currently provide teaching in these professions. Dual education, training courses and initial training for specific technologies will have to be provided in order to ensure that workers attain the professional standards required of them. As some activities related to the renovation of buildings (e.g. insulation) can be carried out without professional qualifications i.e. as an unqualified trade, conditions need to be drawn up to incorporate these professions among regulated trades. Unprofessionally executed work could ultimately prove to be counter-productive, resulting in greater energy intensity or pushing up the costs of obtaining the required level of construction.

## **5. Long-term plan for the renovation of residential and non-residential public and private buildings as a strategic vision to guide the investment decisions of individual investors, the construction industry and financial institutions**

- a) The Long-term Plan for the Renovation of Residential and Non-residential Public and Private Buildings (the 'Long-term Plan') will primarily **emerge from the implementation of the residential and non-residential building renovation strategy**. In this respect, it will encompass specific tasks derived from the strategy, the exploitation of energy-saving potential, and measures that will produce the required savings in final energy consumption for specific categories of residential and non-residential buildings;
- b) the Long-term Plan will be drawn up in outline up to 2030 and in detail up to 2020 with a view to implementing key measures and incentive-based forms of support focusing not only on energy savings, but also on the service life of such buildings and the resulting benefits;
- c) at the same time, the Long-term Plan will identify the scope of potential measures to reduce overall energy requirements and the extent of the forms of support available for both residential and non-residential buildings, and in this respect, where necessary, will provide the incentive to implement further measures or forms of support for the renovation of residential buildings and individual categories of non-residential buildings;
- d) the Long-term Plan, as strategy output, will be updated every three years, and its measures and benefits for the renovation of residential buildings and categories of non-residential buildings will be incorporated into the Action Plan every three years. In line with the requirements of Directive 2012/27/EU, it will also be part of the Action Plan.
- e) the Long-term Plan will be drawn up by 30 June 2015 and submitted to a meeting of the Slovak Government;
- g) the Long-term Plan will also be prepared in such a way that, in the relevant period, it is able to

- guide the investment decisions of individuals, the construction industry and financial institutions;
- h) the template of the Long-term Plan is presented in Annex 9.

## **6. Barriers and obstacles**

A key task in the implementation of the renovation strategy is to achieve, in the very short period between 2015 and 2020, the energy efficiency of buildings by gradually tightening the requirements of the three energy levels of construction. This requires the amendment of legal and technical regulations, new forms of support and sufficient awareness among all building renovation stakeholders.

Well-known barriers in construction also apply to building renovation. These include

- poor energy and legal awareness on the part of owners;
- mixed building ownership (e.g. a residential part and a non-residential part);
- public procurement and tendering procedure geared primarily towards the lowest price;
- the poor quality and low price of design work;
- the low number, price and quality of execution of energy certificates;
- insufficient awareness among construction stakeholders regarding new requirements, measures, construction products, etc.;
- the inadequate system for the training and acquisition of skills required for green professions;
- the lack of lifelong learning for selected professions (e.g. designers);
- the lack of deep renovation (including the renovation of the technical equipment of buildings);
- the lack of renovation of heat distribution systems, heat generators and sources used for the preparation of hot water.

The initial critical tasks to dismantle these barriers are included in the strategy conclusions. Updating the strategy at three-year intervals will make it possible to assess not only the extent to which these tasks have been accomplished, but also to propose and approve other tasks leading to the elimination of these obstacles. Low prices affect the quality and completeness of design documentation and therefore have an adverse effect on the quality of the executed work. The low prices of energy certificates mean that they cannot be drawn up objectively and, consequently, they cannot present the true quality or information about the impact of the measures taken or draft measures recommended for application in the future.

## **7. Conclusions**

The requirement to draw up a strategy for the renovation of residential and non-residential buildings in Slovakia is derived from Directive 2012/27/EU. This strategy is primarily intended to show that investments have been activated (mobilised) in the renovation of the privately and publicly owned national stock of residential and non-residential buildings based on an overview of such stock, the identification of cost-effective approaches to the renovation of such buildings, and the climatic area, with comments on measures for the support of the cost-effective major (deep) renovation of buildings.

The strategy is also intended to form a framework in which to express public priorities in energy

efficiency and, as such, to provide the business community in the energy and construction industries with an indication of the state's long-term vision, thus contributing to the better planning of investments and other action by private businesses.

1. In terms of mobilising investment in the renovation of residential and non-residential buildings after 2014, the building renovation strategy indicates the following mobilisation of investments to promote the renovation of residential and non-residential buildings:

1.1 The renovation of residential buildings (specifically multi-family buildings) will draw on resources from the original JESSICA fund, resources allocated under the Integrated Regional Operational Programme 2014-2020, and national resources via the State Housing Development Fund. As these resources will be insufficient, funds from European banking institutions (MUNSEFF and SLOVSEFF III) and private domestic banking institutions will also be used. A condition of such use will be that the requirements set for the granting of aid be consistent with the criteria required for the energy level of construction after 2015 and, subsequently, after 2020.

1.2 In the long run, in the renovation of non-residential buildings, there are plans to make use of the Structural Funds, in particular via the Operational Programme Quality of the Environment and the Integrated Regional Operational Programme 2014-2020. These resources should be used primarily to support the renovation of public buildings and, in particular in this respect, the renovation of the buildings of central bodies of state administration. The breakdown of resources by operational programme has yet to be discussed and will be subject, in particular, to a national decision when the funds are being broken down into support for the renovation of the structures of non-residential buildings, support for alternative energy sources, and other forms of support related to the renovation of non-residential buildings. Here, too, funds from European banking institutions and national resources under the budget headings of the individual ministries will be used.

2. The specific forms of support for the renovation of residential and non-residential buildings and the scope thereof must be finalised in readiness for the support of buildings at the ultra-low-energy level of construction required after 2015. This incentive scheme should be complemented by training and awareness activities. Where non-residential buildings are concerned (apart from buildings of the central bodies of state administration), we expect the focus to be on tertiary-sphere buildings, including the renovation of school, healthcare, cultural, sports and administrative buildings, as well as buildings for accommodation, services and social welfare, which are owned by the state, towns and municipalities, legal persons and natural persons. The following need to be established:

2.1 The scope of resources and forms of support for multi-family buildings referred to in paragraph 3.2.1 and in paragraphs 1.1 and 2 of the Conclusions.

2.2 The scope of resources and forms of support for non-residential buildings under the Structural Funds, as referred to in paragraph 3.2.2.

Arrange for financial resources to be earmarked in the budget headings of the individual ministries, from the perspective of their renovation plans, in order to perform these tasks.

Based on an approved Partnership Agreement, secure sufficient resources to finance the deep, or at least major, renovation of non-residential buildings so that the owners of the renovated buildings are motivated to achieve the more stringent parameters for the energy performance of buildings.

**Responsible:** Ministry of Transport, Construction and Regional Development, individual operational programme managing authorities

**Deadline:** ongoing

3. As far as conceptual materials are concerned, the concept for the energy performance of buildings was updated and the National Plan was drawn up ahead of the strategy for the renovation of residential and non-residential buildings in Slovakia. Both of those documents contained numerous measures associated with the renovation of buildings and therefore they were revised and included in the strategy's measures as applicable materials:

3.1 Achieve the following energy levels of construction in the renovation of residential and non-residential buildings as follows:

- a) the ultra-low-energy level of construction for all buildings renovated from 1 January 2016, assuming compliance with the levels established for the cost optimisation of minimum requirements for the energy performance of buildings;
- b) the energy level of nearly zero-energy buildings used and owned by central bodies of state administration from 1 January 2019 and all buildings from 1 January 2021, assuming compliance with the levels established for the cost optimisation of minimum requirements for the energy performance of buildings.

3.2 Arrange for the preparation of design documentation for the different energy levels of construction by the required deadlines. Design documentation for both new and renovated buildings submitted for building permits:

- a) must exist for all renovated buildings after 1 January 2015, assuming compliance with the levels established for the cost optimisation of minimum requirements for the energy performance of buildings;
- b) must be at a nearly zero level of energy intensity for new public buildings after 1 January 2018 and at a nearly zero level of energy intensity for all new and renovated buildings after 1 January 2020, assuming compliance with the levels established for the cost optimisation of minimum requirements for the energy performance of renovated buildings.

3.3 Prepare a lifelong learning programme for designers in collaboration with the Slovak Chamber of Civil Engineers (SKSI) and the Slovak Chamber of Architects (SKA) covering the energy performance of buildings from the perspective of design documentation for construction work in the years from 2015 to 2020.

**Responsible:** Ministry of Transport, Construction and Regional Development, in collaboration with professional organisations (SKSI, SKA)

**Deadline:** 30 June 2015

4. Introduce and expand statistics on all residential and non-residential buildings being either commenced or completed in order to collect the necessary technical information for a comparison of the results achieved in Slovakia with other Member States in technical analyses (building permits, certificates of final approval) so that energy performance can be evaluated for all building categories.

**Responsible:** Ministry of Transport, Construction and Regional Development, Statistical Office

**Deadline:** 30 June 2015

5. Expansion of the information campaign to include information on the construction of nearly zero-energy buildings and information on the building renovation strategy.

**Responsible:** Ministry of Transport, Construction and Regional Development  
**Deadline:** 30 June 2015

6. In response to the more stringent requirements regarding the energy level of construction, draw up ministerial guidelines regarding the conditions under which measures will be applied to existing buildings when they are renovated, accompanied by specifically stipulated procedure and requirements.

**Responsible:** Ministry of Transport, Construction and Regional Development  
**Deadline:** 30 June 2015

7. Requirements for the individual energy levels of construction – not only for new, but also for renovated buildings – will gradually be tightened up to 2020. If the required level of construction is to be achieved, design documentation must be prepared to a sound standard; new materials, construction products and innovative technologies must be used; and, in particular, construction work must be carried out to a high quality. In order to increase the skills, education and expertise of workers in the construction industry, arrangements need to be made for dual training, with a specification of each ministry's share. Introduce professions related to the energy performance of buildings as trades.

**Responsible:** Ministry of Education, Science, Research and Sport, Ministry of Economy, Ministry of Labour, Social Affairs and Family, Ministry of Transport, Construction and Regional Development  
**Deadline:** ongoing

8. In the field of science and technology, projects geared towards the development and research of new innovative materials and technology to be applied in the renovation of buildings need to be supported.

**Responsible:** Ministry of Education, Science, Research and Sport, Ministry of Transport, Construction and Regional Development, Ministry of Economy  
**Deadline:** ongoing

9. Use research results to create conditions for the application of new materials and for the improvement of buildings renovated in the past to bring them up to the level of the more stringent requirements established for the energy performance of buildings (thermal insulation, new-generation windows and doors).

**Responsible:** Ministry of Transport, Construction and Regional Development  
**Deadline:** 31 December 2015

10. Draw up a Long-term Plan for the Renovation of Residential and Non-residential Public and Private Buildings up to 2020, with an Outlook up to 2030, with a view to implementing key measures and incentive-based forms of support focusing not only on energy savings, but also on the service life of such buildings and the resulting benefits;

**Responsible:** Ministry of Transport, Construction and Regional Development, central bodies of state administration, higher territorial units, associations of towns and municipalities  
**Deadline:** 30 June 2015

## **8. Annexes**

### **Annex 1**

Terms and definitions associated with the renovation of residential and non-residential buildings

### **Annex 2**

Underlying documentation from the 2011 Population and Housing Census on the scope of renovation of multi-family and single-family buildings

### **Annex 3**

Numbers of renovated residential buildings (dwellings) supported under the housing development scheme and the State Housing Development Fund

### **Annex 4**

Numbers of energy certificates issued for major renovations of buildings in 2010-2013

### **Annex 5**

Information on the stock of residential and non-residential buildings

### **Annex 6**

Cost-effective measures to improve the energy performance of buildings

### **Annex 7**

Cost-optimal levels of minimum building energy performance requirements

### **Annex 8**

Summary of energy-saving measures, their benefit and energy-saving potential in the period from 2015, with an outlook up to 2030

### **Annex 9**

Long-term Plan for the Renovation of Residential and Non-residential Public and Private Buildings up to 2020, with an Outlook up to 2030 (Template)