REPUBLIC OF BULGARIA

Ministry of Energy

NATIONAL LONG-TERM PROGRAMME

for the promotion of investments in measures aimed at improving the energy performance of the national stock of public and private residential and commercial buildings

2016–2020

Sofia, May 2017

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ACRONYMS

AUER	Sustainable Energy Development Agency
FG	Financial grant
VAT	Value Added Tax
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
Commission	European Commission
EU	European Union
ESCO	Energy service companies
EC	European Community
ERDF	European Regional Development Fund
EFSI	European Fund for Strategic Investments
ZEE	Energy Efficiency Act
ZID	Act amending and supplementing another Act
ZUES	Condominium Management Act
ZUT	Spatial Planning Act
KEVR	Energy and Water Regulatory Commission
ME	Ministry of Energy
MRRB	Ministry of Regional Development and Public Works
CoM	Council of Ministers
MF	Ministry of Finance
NTEF	National Trust EcoFund
NPDEE	National energy efficiency action plan
NSI	National Statistical Institute
OPRG	Operational Programme ‘Regions in Growth’ 2014–2020
PPP	Public-private partnership
GFA	Gross floor area
AOs	Associations of owners
OSSU	Owner of a self-sustained unit
FEEVI	Energy Efficiency and Renewable Sources Fund

The National long-term programme for the promotion of investments in measures aimed at improving the energy performance of the national stock of public and private residential and commercial buildings is developed by a team of scientists at the Technical University of Sofia under a contract awarded by the institution primarily responsible for the development of the Programme, the Ministry of Regional Development and Public Works. The various scenarios developed by the team are based on data valid as of 1 January 2016. The details related to policies and measures were updated by the Ministry of Energy and are valid as of 1 January 2017.

INTRODUCTION

Having regard to the cumulative impact of energy efficiency (EE) on the quality of citizens' life (health, comfort, wellbeing, purchasing power, self-esteem), EE has been identified as a lasting priority of Europe's development until 2020 and further on until 2050.

In the Europe 2020 strategy, energy efficiency is a priority theme embedded in one of the seven flagship initiatives, Resource-efficient Europe. In combination with the renewable energy target, which is also expressed in quantitative terms, these two themes are regarded as key factors for sustainable growth and continuing development in Europe.

It is a proven fact that energy efficiency measures have an integrated impact, which is why the EU will staunchly support and encourage energy efficiency improvement policies over the next decades. The recent developments of Union law in the area of energy efficiency point to an increasing focus on cost efficiency. This important principle is also an essential criterion on the basis of which Member States should develop and update their energy efficiency standards.

The Union's energy efficiency policies are laid out in Directive 2012/27/EU on energy efficiency and in Directive 2010/31/EU on the energy performance of buildings, in conjunction with the implementation of the requirements set out in Directive 2009/28/EC on the promotion of the use of energy from renewable sources, Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy-related products and its implementing regulations, Directive 2010/30/EU on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products, Regulation (EU) No 305/2011, the applicable EU standards, technical criteria, methods, and good European practices.

The National long-term programme for the promotion of investments in measures aimed at improving the energy performance of the national stock of public and private residential and commercial buildings (the Programme) is developed on the basis of Article 5(3)(4) of the Energy Efficiency Act (ZEE) with regard to the obligations of Member States, including Bulgaria, as per Article 4 of Directive 2012/27/EU. In accordance with § 20 of the ZEE Transitional and Final Provisions, the Plan is to be submitted to the European Commission as part of the plans referred to in Article 5(3)(1) ZEE and updated every three years after 30 April 2014.

While the Programme implements a specific sectoral policy, its realisation would not be possible without integration with other national goals and priorities. National documents which are binding on the implementation of the Programme include: National Energy Efficiency Action Plan 2014–2020; National Programme for Development: Bulgaria 2020; National Reform Programme (updated 2014, supports the implementation of Europe 2020), Convergence Programme of Bulgaria 2014–2017; National Regional Development Strategy 2012–2022; National Spatial Development Concept 2013–2025; Partnership Agreement with the Republic of Bulgaria outlining the support from the EU Structural and Investment Funds in 2014–2020; the Operational programmes for the programming period 2014–2020; the Third National Action Plan on Climate Change 2013–2020 and other applicable documents.

Implementation of the Programme will contribute to the national objectives which Bulgaria will pursue in the coming years in order to enhance its growth potential. The main focus of the Programme is its contribution to implementation of the National Programme for Development: Bulgaria 2020, a document which is fundamental to Bulgaria's development and to the Union's priorities for smart, sustainable and involving growth as formulated in Europe 2020. In the context of the National Programme for Development: Bulgaria 2020, this Programme will contribute to the national energy efficiency target by 2020.

Overarching objective:

Create a sustainable model for the management of energy efficiency in Bulgaria by applying efficient and integrated policies aimed at sustainable development, flexible financial mechanisms and successful practices with a view to achieving substantial savings at a national level for the sake of people, quality of life, reduction of carbon emissions and conservation of the Bulgaria's energy resources.

Specific objectives:

1. Encourage the commitment of private capital in increasing the level of energy efficiency by ensuring appropriate functioning of the internal market for EE services at the level of final energy users in buildings.
2. Foster the energy efficiency of the public and private stock of residential and commercial buildings in Bulgaria to a high national level of energy savings by applying large-scale measures aimed at improving the energy performance of buildings though cost-effective methods and highly efficient technologies.
3. Exercise efficient national monitoring of the energy and environmental performance of buildings in Bulgaria by applying the achievements of Bulgarian science in combination with successful European and global practices in the area of energy efficiency of buildings.
4. Develop a national mechanism to promote sustainable end-user behaviour aimed at the efficient use of energy in buildings.

1. OVERVIEW OF THE NATIONAL BUILDING STOCK

For the purpose of calculating energy costs and performance, the national law assigns all buildings to several categories depending on their intended use:

A. Residential buildings:

a) single-family houses;

b) multifamily residential buildings (apartment blocks), which can be low-rise, medium-rise or high-rise;

c) mixed-use buildings;

d) social services buildings (resident-type).

B. Non-residential public buildings:

a) buildings intended for administrative services;

b) buildings intended for education and culture;

c) buildings in the area of healthcare;

d) buildings in the area of hotel-keeping;

e) buildings in the area of commerce, catering and services;

f) buildings intended for sport;

g) buildings in the area of culture and art;

h) other public buildings (as per the nomenclature in Regulation No 1 of July 2003 on the nomenclature of buildings and structures).

A general assessment of the indicators used for the classification of buildings was undertaken for the purposes of the Programme. The classification provided in *Regulation No 1 on the nomenclature of buildings and structures in Bulgaria* was used in order to identify appropriate distinguishing factors and obtain reliable information about the two main categories: residential buildings and public buildings (and the subcategories of public buildings). The classification scheme is shown in Figure 1-1. The figure displays two levels of classification indicators — the first level is the functional use of the building while the second level comprises specific indicators that distinguish the buildings by their structural type, spatial planning characteristics, age, ZUT category and type of heating/cooling system.

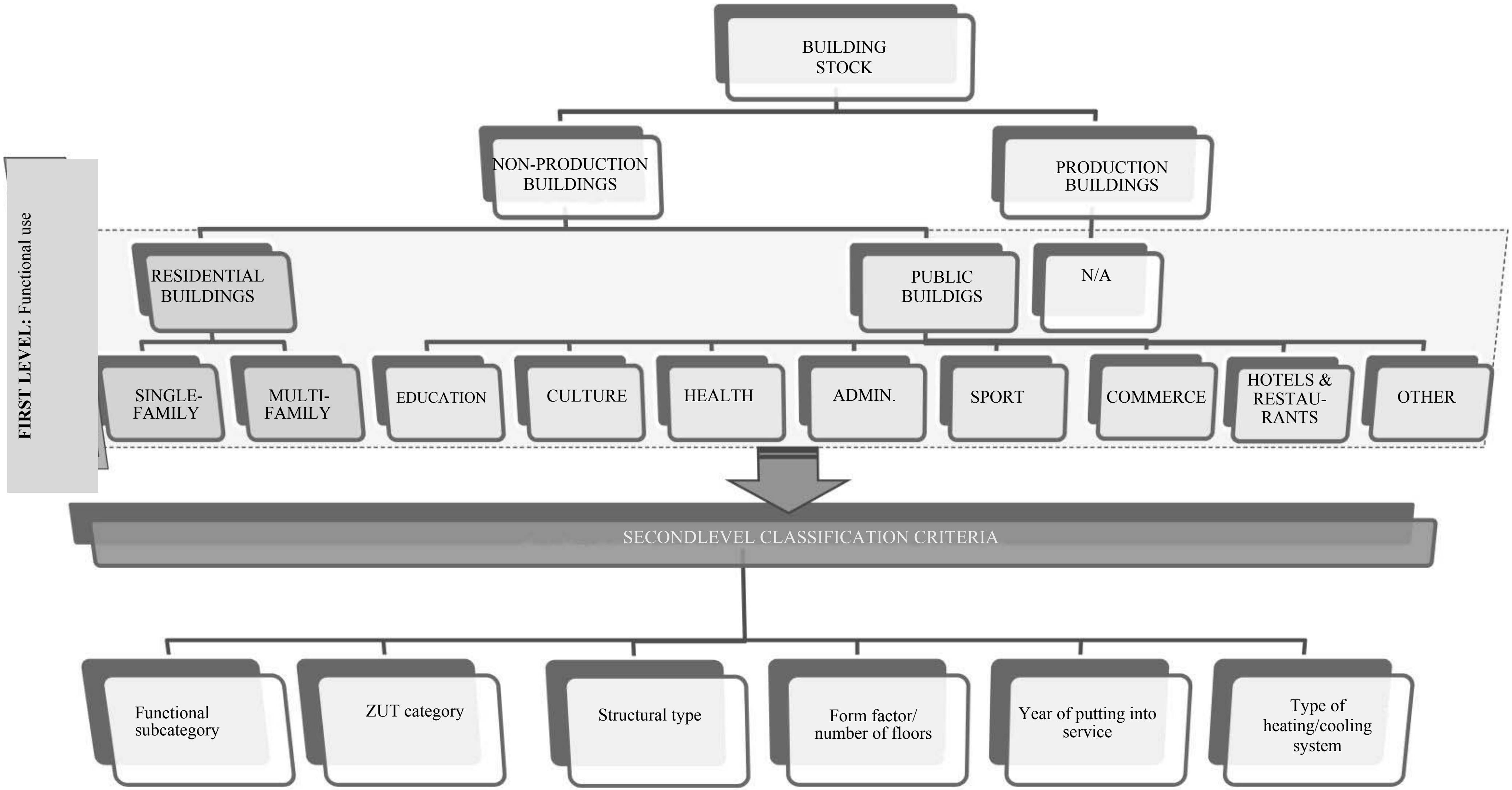

Figure 1-1: Classification[1] of the building stock

[1] As per Regulation No 1 on the nomenclature of buildings and structures in Bulgaria

A centralised database of building stock capturing the entire public sector of Bulgaria is not available. Research into potential sources of information helped identify data sets produced mainly by private projects completed in recent years. These official publications offer more detailed information on the building stock in Bulgaria; however, the data are not confirmed by Bulgarian institutions. An example is 'Construction of nearly-zero energy buildings (NZEB) in Bulgaria: Towards a definition and road map', a report published August 2012 by the Building Performance Institute Europe (BPIE) in collaboration with Ecofys Germany GmbH and EnEffect Bulgaria. According to the report, *'The overall gross floor area of Bulgaria's building sector in 2010 is around 262 million m^2, including 212 million m^2 of gross floor area in the residential sector and 50 million m^2 in the not-residential sector.'* Since non-residential data are not confirmed, this Programme uses only official data provided by ministries and agencies. These datasets are treated as a representative sample of the non-residential sector because they are collected by Bulgarian local and central authorities in the framework of the national arrangements for the certification of buildings and for reporting the impact of measures completed under the ZEE.

Assessment of non-residential buildings is based on data provided by the AUER, while assessment of residential buildings is based on statistical data provided by *Project No BG161PO001/5-01/2008/076 'Analysis, assessment and update of regulatory acts in support of OPRD 2014–2020'* completed by the MRRB in 2013.

The database used by the Programme was processed and analysed at the Centre for Energy Analysis (CEA), a research laboratory with the Technical University of Sofia. The CEA also developed simulative models of energy consumption and scenarios for renovating the buildings by combinations of energy saving measures (ESM). The assessment of the existing building stock was supported by an energy profile of the buildings created with the following techniques:

- *Statistical approach* to assess the completeness and representativeness of the data inputs used for evaluating the building stock;
- *Systemic approach* to create a modular hierarchical structure of data repositories in a specified sequence and by specified criteria (developing a system of parameters);
- *Statistical analysis* to identify the statistical distribution of characteristics of the building sector; and
- *Comparative analysis* of the energy performance of existing buildings.

The *systemic approach* was applied in order to arrive at a reliable classification using a strict sequence of steps:

- ✓ identification of alternative and mutually complementary databases of a representative nature available in Bulgaria;
- ✓ vetting and verification of the quality and reliability of the information contained in the available databases;
- ✓ adoption of indicators and criteria for creating representative subsets of data on the buildings in the various subcategories;

- ✓ hierarchical processing of the data in order to identify representative groups and reference buildings in each group.

The *statistical analysis* phase included:

- visual approach to the databases to help identify patterns exhibited by buildings in which energy savings measures have already been applied;
- selection by applying specific techniques;
- visualisation of multidimensional data to reduce dataset sizes down to reliable samples for each assessment criterion.

The following system of *assessment indicators* is derived from the available reliable information on existing building stock:

- ✓ categorisation of the buildings in accordance with the regulatory basis;
- ✓ distribution by *year of putting into service*, differentiating between buildings constructed before and after two consecutive changes in the constructional/technical standards;
- ✓ distribution by *type of the heating/cooling system*;
- ✓ distribution by *GFA of the building*;
- ✓ distribution by *structural type*;
- ✓ distribution by *functional use*.

Two runs of the assessment cycle were made, one for *non-residential buildings* and one for *residential buildings*. The *structural type* criterion was not applied to non-residential buildings for want of sufficiently reliable data.

1.1 Overview and classification of public (non-residential) buildings

An analysis was made of 9 555 entries in a database provided by the AUER containing information about the basic technical parameters of municipal and state buildings. The entries were valid as of 1 January 2016. A sample of 8 611 buildings of combined GFA 16 524 753 m^2 considered sufficiently reliable for information analysis purposes was extracted from the initial dataset. Information on the form of ownership of 710 buildings of combined GFA 963 380 m^2 was not available in the database.

Table 1.1-1 Basic dataset used for the analysis of public buildings with a breakdown by GFA and functional subcategory

Functional subcategory	*Indicator*	*Total*	*250–1 000 m^2*	*1 000–5 000 m^2*	*5 000–10 000 m^2*	*Above 10 000 m^2*
Administrative building	count	2 393	1 548	736	83	26
	GFA, m^2	3 296 490	80 9434	1 444 876	548 147	494 033
Hospital	count	66	12	25	16	13
	GFA, m^2	380 488	7 240	76 091	114 323	182 835
Kindergarten/nursery	count	1 326	609	709	8	0
	GFA, m^2	1 747 051	354 038	1 346 205	46 809	0
Social home	count	185	110	68	6	1
	GFA, m^2	236 447	58 880	125 614	40 856	11 097
Building in the area of culture and art	Count	322	191	107	18	6
	GFA, m^2	516 668	100 754	213 756	120 568	81 589
Hostel	count	315	65	161	74	15
	GFA, m^2	1 284 221	39 794	431 630	545 372	267 424
School	count	2 125	706	1 093	274	52
	GFA, m^2	5 665 360	409 704	2 591 295	1 923 298	741 067
Public library/community centre	count	688	432	251	5	0
	GFA, m^2	717 457	253 176	434 397	29 884	0
Outpatient clinic	count	242	178	52	10	2
	GFA, m^2	331 008	82 346	110 697	67 763	70 203
University/college	count	288	54	140	64	30
	GFA, m^2	1 427 077	33 653	369 895	448 571	574 958
Sport building	count	143	57	72	10	4
	GFA, m^2	291 167	29 579	144 007	66 440	51 141

Functional subcategory	Indicator	Total	250–1 000 m²	1 000–5 000 m²	5 000–10 000 m²	Above 10 000 m²
Building in the area of commerce or hotel-keeping	count	118	74	34	7	3
	GFA, m²	188 736	37 015	65 491	48 656	37 574
Building in the area of transport	count	8	6	2	0	0
	GFA, m²	5 409	2 495	2 914	0	0
Other	count	392	267	111	14	0
	GFA, m²	437 173	128 687	212 651	95 836	0
Total	***count***	***8 611***	***4 309***	***3 561***	***589***	***152***
	GFA, m2	***16 524 757***	***2 346 795***	***7 569 518***	***4 096 520***	***2 511 921***

In the next step of the assessment process a distinction was made between buildings (GFA) which have already been renovated by the application of energy saving measures (ESM buildings) and those in which ESM renovation is not applied (non-ESM buildings).

Table 1.1-2 ESM and non-ESM public buildings[2] as of 1 January 2016
(based on a sample of 8 611 buildings)

Indicator	ESM buildings, GFA	Non-ESM buildings, GFA	Total
Public buildings owned by the State			
count	1 073	1 222	2 295
m²	3 289 347	3 039 026	6 328 373
Public buildings owned by municipalities			
count	2 491	3 825	6 316
m²	4 854 922	5 341 458	10 196 380

The charts in Figures 1.1-1 to 1.1-12 present the distribution of the sample of 8 611 buildings by selected criteria (indicators).

[2] Buildings of the Ministry of Defence are not included.

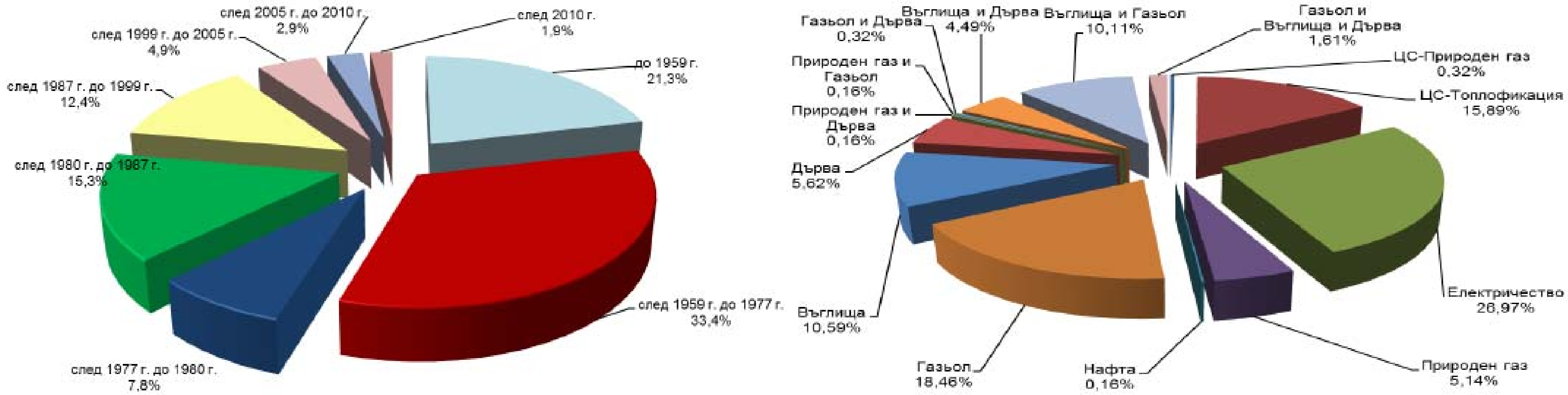

Figure 1-1.1: Administrative buildings. Distribution by year of putting into service and source of heating/cooling

Key:

Year of putting into service: before 1959: 21.3 %; 1959–1977: 33.4 %; 1977–1980: 7.8 %; 1980–1987: 15.3 %; 1987–1999: 12.4 %; 1999–2005: 4.9 %; 2005–2010: 2.9 %; 2010 onwards: 1.9 %

Heating/cooling system: Electricity: 26.97 %; District heating (other than natural gas): 15.89 %; District heating (natural gas): 0.32 %; Gasoil, firewood and coal: 1.61 %; Coal and gasoil: 10.11 %; Coal and firewood: 4.49 %; Gasoil and firewood: 0.32 %; Natural gas and gasoil: 0.16 %; Natural gas and firewood: 0.16 %; Firewood: 5.62 %; Coal: 10.59 %; Gasoil 18.46 %; Heating oil: 0.16 %; Natural gas: 5.14 %

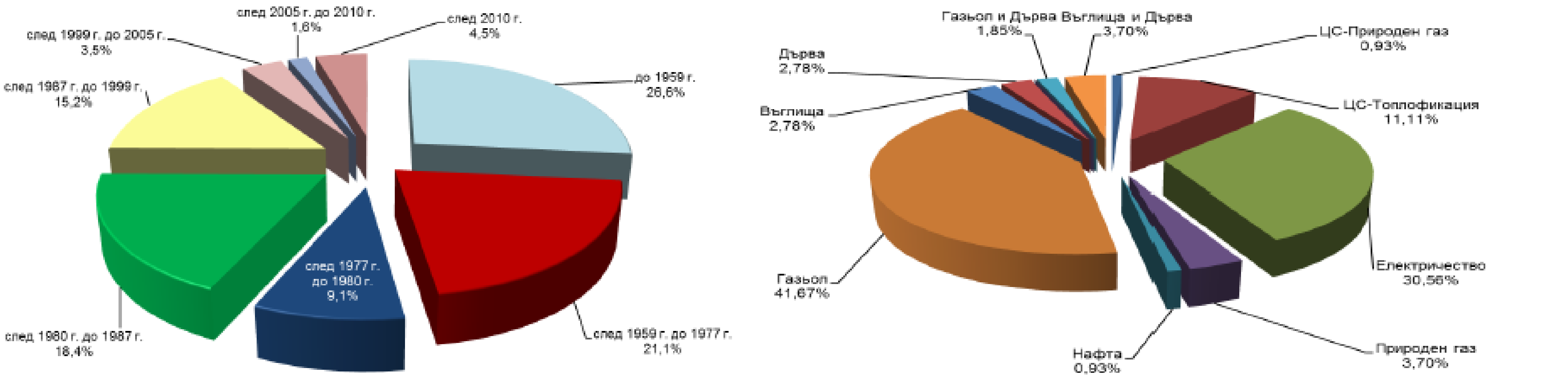

Figure 1.1-2: Multi-profile hospitals for acute treatment. Distribution by year of putting into service and source of heating/cooling

Key:
Year of putting into service: before 1959: 26.6 %; 1959–1977: 21.1 %; 1977–1980: 9.1 %; 1980–1987: 18.4 %; 1987–1999: 15.2 %; 1999–2005: 3.5 %; 2005–2010: 1.6 %; 2010 onwards: 4.5 %

Heating/cooling system: Electricity: 30.56 %; District heating (other than natural gas): 11.11 %; District heating (natural gas): 0.93 %; Firewood and coal: 3.70 %; Gasoil and firewood: 1.85 %; Firewood: 2.78 %; Coal: 2.76 %; Gasoil 41.67 %; Heating oil: 0.93 %; Natural gas: 3.70 %

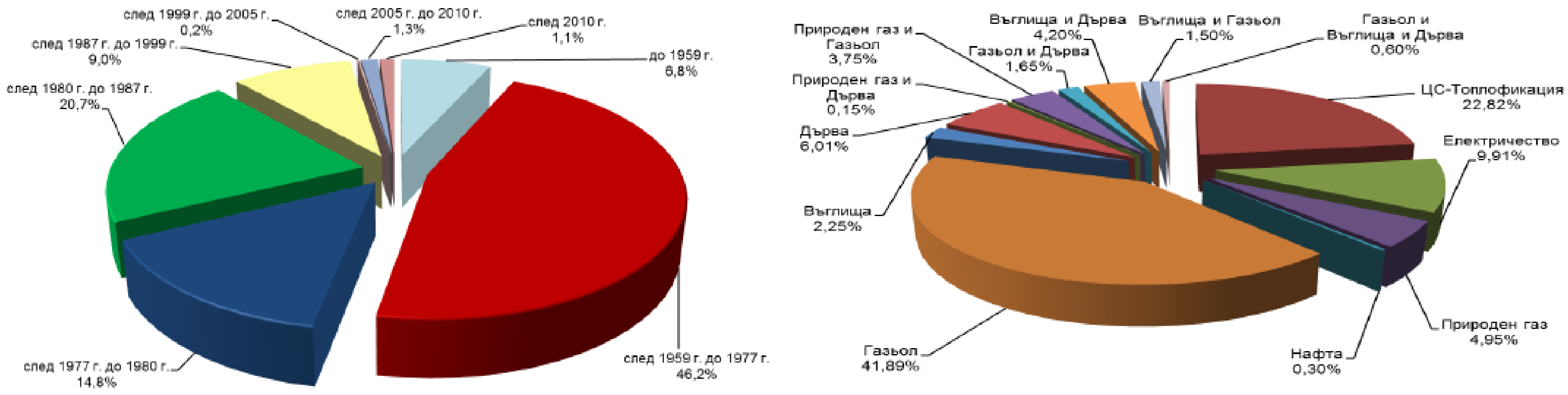

Figure 1.1-3: Kindergartens and nurseries. Distribution by year of putting into service and source of heating/cooling

Key:
Year of putting into service: before 1959: 6.8 %; 1959–1977: 46.2 %; 1977–1980: 14.8 %; 1980–1987: 20.7 %; 1987–1999: 9.0 %; 1999–2005: 0.2 %; 2005–2010: 1.3 %; 2010 onwards: 1.1 %

Heating/cooling system: Electricity: 9.91 %; District heating (other than natural gas): 22.82 %; Gasoil, firewood and coal: 0.60 %; Coal and gasoil: 1.50 %; Coal and firewood: 4.20 %; Gasoil and firewood: 1.65 %; Natural gas and gasoil: 3.75 %; Natural gas and firewood: 0.15 %; Firewood: 6.01 %; Coal: 2.25 %; Gasoil 41.89 %; Heating oil: 0.30 %; Natural gas: 4.96 %

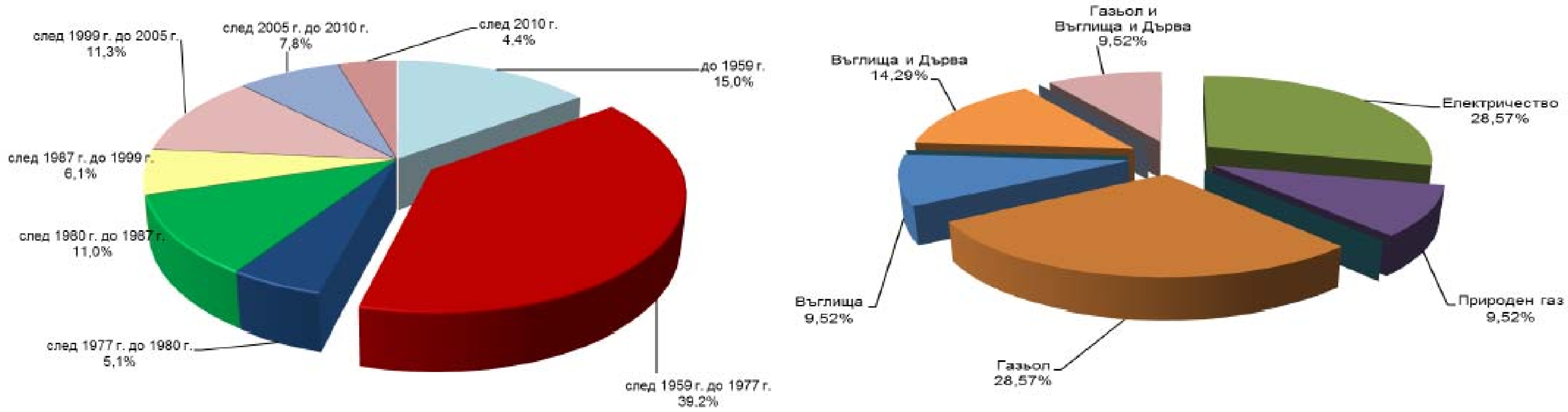

Figure 1.1-4: Social homes. Distribution by year of putting into service and source of heating/cooling

Key:
Year of putting into service: before 1959: 15.0 %; 1959–1977: 39.2 %; 1977–1980: 5.1 %; 1980–1987: 11.0 %; 1987–1999: 6.1 %; 1999–2005: 11.3 %; 2005–2010: 7.8 %; 2010 onwards: 4.4 %

Heating/cooling system: Electricity: 28.57 %; Gasoil, firewood and coal: 9.52 %; Coal and firewood: 14.29 %; Coal: 9.52 %; Gasoil 28.57 %; Natural gas: 9.52 %

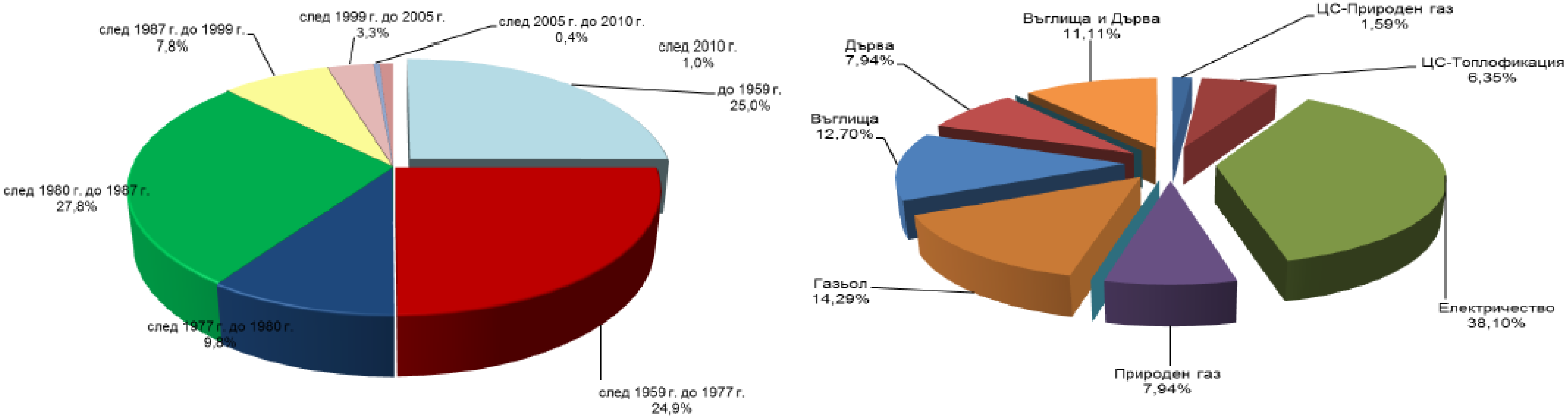

Figure 1.1-5: Buildings in the area of culture and art. Distribution by year of putting into service and source of heating/cooling

Key:
Year of putting into service: before 1959: 25.0 %; 1959–1977: 24.9 %; 1977–1980: 9.8 %; 1980–1987: 27.8 %; 1987–1999: 7.8 %; 1999–2005: 3.3 %; 2005–2010: 0.4 %; 2010 onwards: 1.0 %

Heating/cooling system: Electricity: 38.10 %; District heating (other than natural gas): 6.35 %; District heating (natural gas): 1.59 %; Coal and firewood: 11.11 %; Firewood: 7.94 %; Coal: 12.70 %; Gasoil 14.29 %; Natural gas: 7.94 %

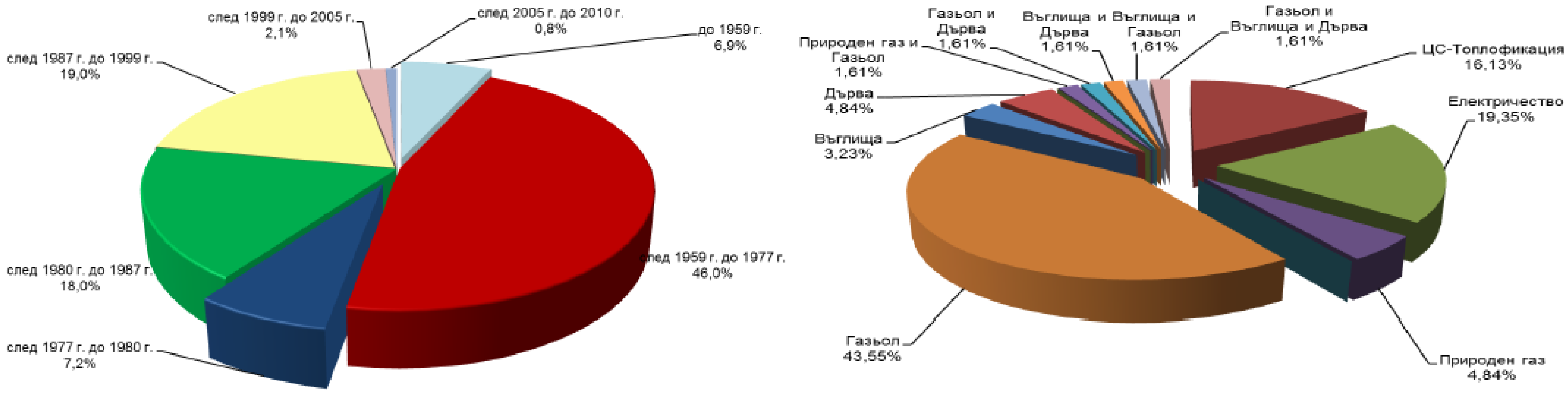

Figure 1.1-6: Hostels. Distribution by year of putting into service and source of heating/cooling

Key:
Year of putting into service: before 1959: 6.9 %; 1959–1977: 46.0 %; 1977–1980: 7.2 %; 1980–1987: 18.0 %; 1987–1999: 19.0 %; 1999–2005: 2.1 %; 2005–2010: 0.8 %; 2010 onwards: 1.0 %

Heating/cooling system: Electricity: 19.35 %; District heating (other than natural gas): 16.13 %; Gasoil, firewood and coal: 1.61 %; Coal and gasoil: 1.61 %; Coal and firewood: 1.61 %; Gasoil and firewood: 1.61 %; Natural gas and gasoil: 1.61 %; Firewood: 4.84 %; Coal: 3.23 %; Gasoil 43.55 %; Natural gas: 4.84 %

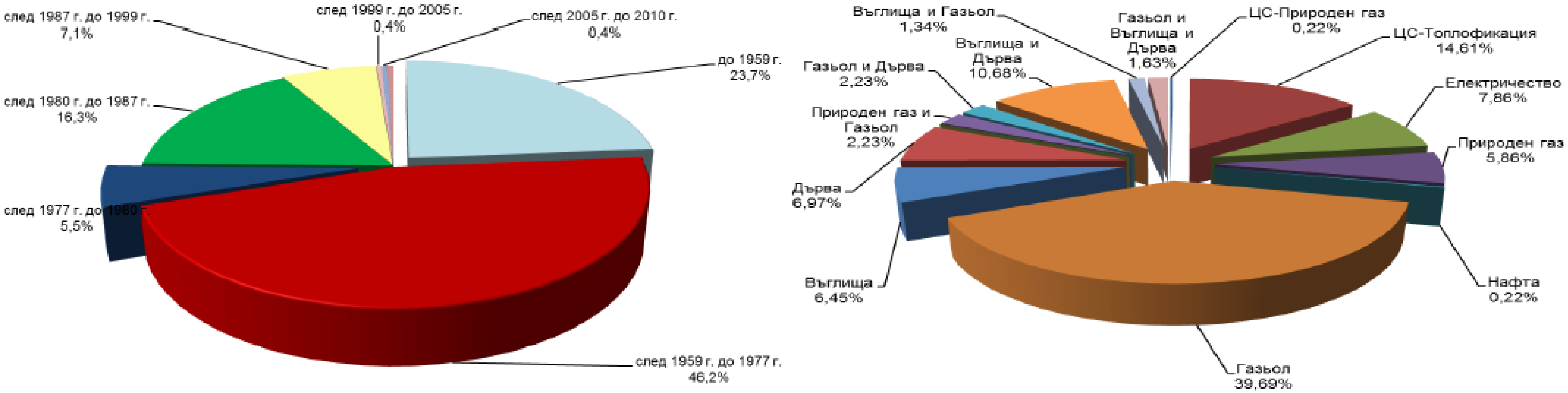

Figure 1.1-7: School buildings. Distribution by year of putting into service and source of heating/cooling

Key:
Year of putting into service: before 1959: 23.7 %; 1959–1977: 46.2 %; 1977–1980: 5.5 %; 1980–1987: 16.3 %; 1987–1999: 7.1 %; 1999–2005: 0.4 %; 2005–2010: 0.4 %

Heating/cooling system: Electricity: 7.86 %; District heating (other than natural gas): 14.61 %; District heating (natural gas): 0.22 %; Gasoil, firewood and coal: 1.63 %; Coal and gasoil: 1.34 %; Coal and firewood: 10.68 %; Gasoil and firewood: 2.23 %; Natural gas and gasoil: 2.23 %; Firewood: 6.97 %; Coal: 6.45 %; Gasoil 36.69 %

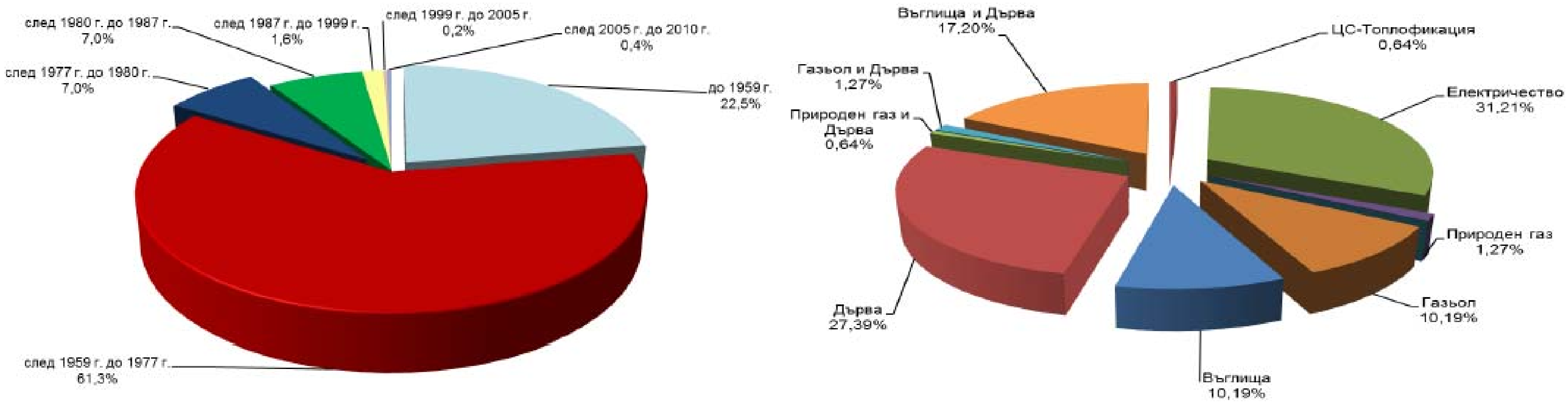

Figure 1.1-8: Public libraries/community centres. Distribution by year of putting into service and source of heating/cooling

Key:
Year of putting into service: before 1959: 22.5 %; 1959–1977: 61.3 %; 1977–1980: 7.0 %; 1980–1987: 7.0 %; 1987–1999: 1.6 %; 1999–2005: 0.2 %; 2005–2010: 0.4 %

Heating/cooling system: Electricity: 31.21 %; District heating (other than natural gas): 0.64 %; Coal and firewood: 17.20 %; Gasoil and firewood: 1.27 %; Natural gas and firewood: 0.64 %; Firewood: 27.39 %; Coal: 10.19 %

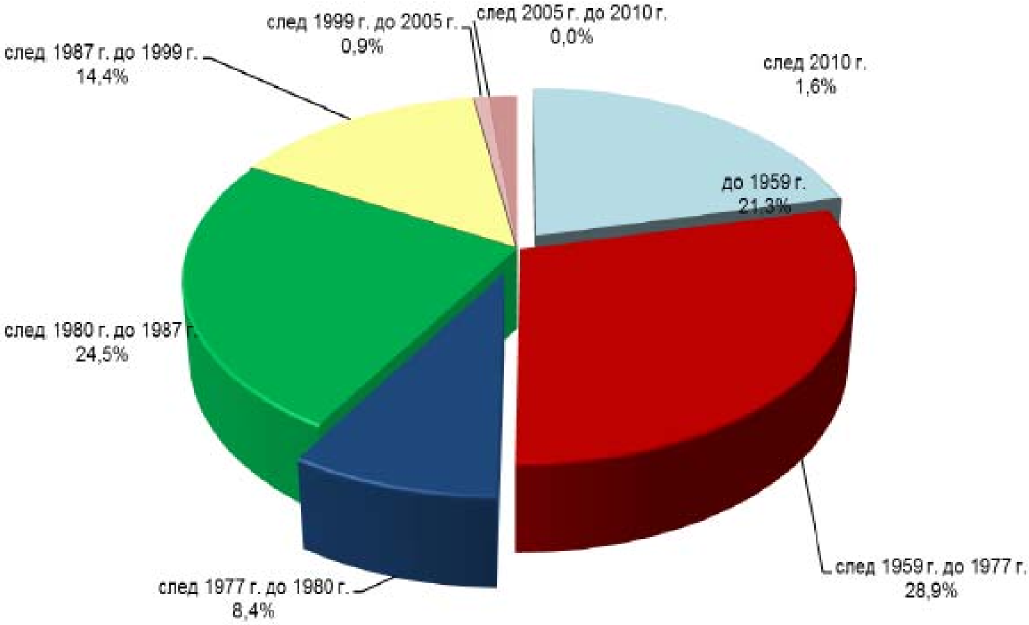

Figure 1.1-9: Outpatient clinics. Distribution by year of putting into service

Key:
Year of putting into service: before 1959: 21.3 %; 1959–1977: 28.9 %; 1977–1980: 8.4 %; 1980–1987: 24.5 %; 1987–1999: 14.4 %; 1999–2005: 0.9 %; 2005–2010: 0.0 %; 2010 onwards: 1.6 %

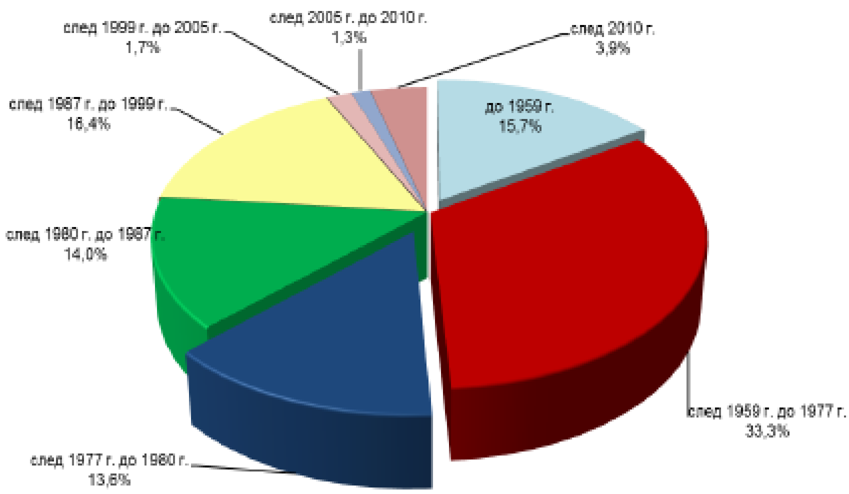

Figure 1.1-10: Universities/colleges. Distribution by year of putting into service

Key:
Year of putting into service: before 1959: 15.7 %; 1959–1977: 33.3 %; 1977–1980: 13.6 %; 1980–1987: 14.0 %; 1987–1999: 16.4 %; 1999–2005: 1.7 %; 2005–2010: 1.3 %; 2010 onwards: 3.9 %

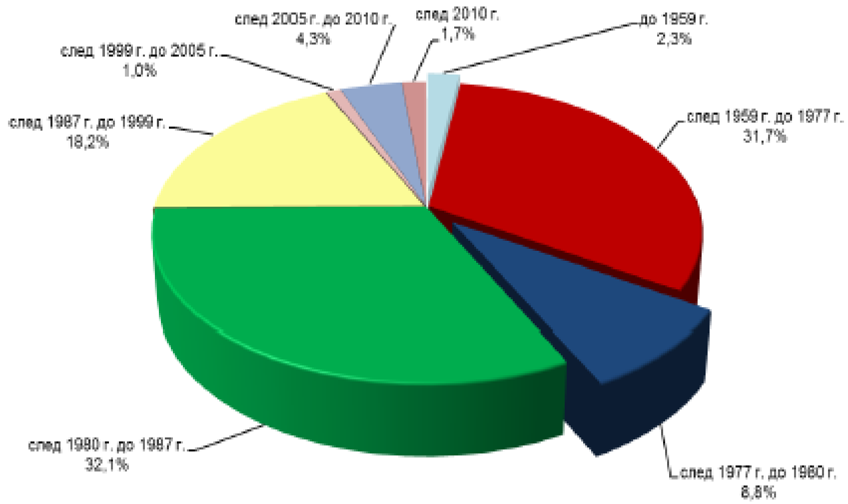

Figure 1.1-11: Buildings intended for sport. Distribution by year of putting into service

Key:

Year of putting into service: before 1959: 2.3 %; 1959–1977: 31.7 %; 1977–1980: 8.8 %; 1980–1987: 32.1 %; 1987–1999: 18.2 %; 1999–2005: 1.0 %; 2005–2010: 4.3 %; 2010 onwards: 1.7 %

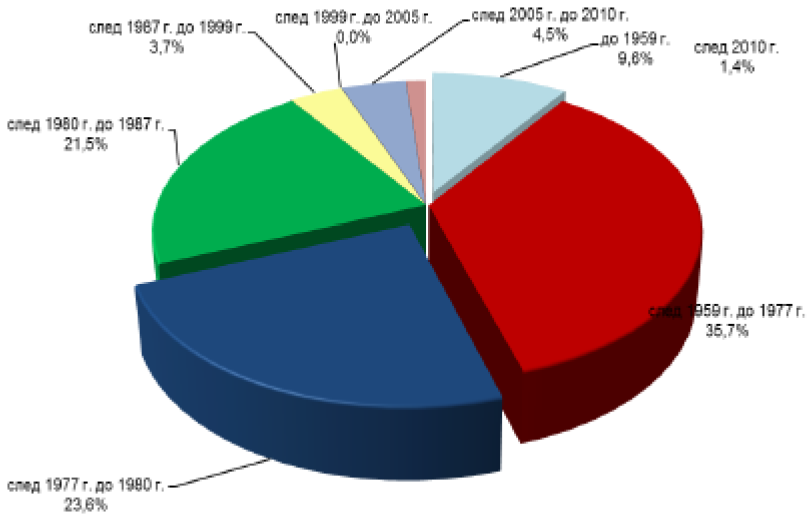

Figure 1.1-12: Buildings in the area of commerce or hotel-keeping. Distribution by year of putting into service

Key:

Year of putting into service: before 1959: 9.6 %; 1959–1977: 35.7 %; 1977–1980: 23.6 %; 1980–1987: 21.5 %; 1987–1999: 3.7 %; 1999–2005: 0.0 %; 2005–2010: 4.5 %; 2010 onwards: 1.4 %

1.2 Overview and classification of residential buildings in Bulgaria

The analysis of residential buildings is based on official data of the National Statistical Institute. Benchmarking to other Member States is made by using indicators which are monitored at EU level and reported by Eurostat.

The data provide a snapshot of the residential sector at the time of the 2011 Census of population and housing stock which was conducted in line with the requirements laid down in Regulation (EC) No 763/2008 of the European Parliament and of the Council on population and housing censuses.

Two groups of indicators were employed to assess the status of the housing stock:

- *Technical indicators* were used to evaluate the overall technical repair and performance of the buildings, the measures to achieve and maintain compliance with the essential requirements to each building (such as load bearing capacity, safe use, fire system, energy efficiency, hygiene, protection of human life and health, soundproofing, protection of the environment, accessibility), and cost-efficiency of the various measures. The technical indicators and their values strongly depend on a range factors such as state of art at the time of construction, the time for which the buildings has been in used, user behaviour, cultural, social, moral and financial aspects of inhabitants, and quality of life in the buildings.

- Indicators which describe the current level of *income and living conditions* using data from EU-SILC, a statistical dataset at EU level which gauges target variables specified in a standardised manner to enable benchmarking and evaluation of growth and social exclusion.

Both the values and the trends of the indicators included in the assessment are variable, therefore the analytical output should be considered as a snapshot of the existing situation. Nevertheless, patterns can be observed with certain parameters.

1.2.1 Overall assessment of the housing stock

According to the most recent census, as at 1 February 2011 there were 3 887 149 residential units in Bulgaria, including 3 839 342 (98.8 %) in residential buildings, 22 103 (0.6 %) in student hostels, 21 339 (0.5 %) in non-residential buildings, as well as 818 collective housing units and 3 547 (0.1 %) primitive and mobile units. As at 1 February 2012 most of the residential units (65.9 %) had two or three rooms.

In 2011, the NSI divided the residential buildings into five main structural types:

- *Panel buildings* are those made of panels (prefabricated elements).
- *Reinforced concrete buildings* (reinforced concrete structure with slabs and columns) are monolithic buildings (with reinforced concrete slabs (MSB), large-size formwork (EPK), package-hoisted slabs (PPP), creeping formwork (PK), skeleton buildings – frame buildings, beamless-skeleton buildings, special structure buildings, etc.).
- Brick buildings (with concrete slabs) are buildings having brick walls and concrete slabs between the

floors, but not having reinforced-concrete columns.

- *Brick buildings with trimmer joists without reinforced concrete* are buildings having brick walls and concrete slabs between the floors, but not having reinforced concrete columns.
- *Other buildings* are those made of stone, clay, timber, wooden boards or chipboards.

In the statistical information from the 2011 census the ‘other buildings’ group was further subdivided in accordance with the methodology of the NSI.

Reinforced concrete buildings have a load bearing frame structure and floors of reinforced concrete, with walls made of panels, bricks or other materials.

Monolithic buildings have load bearing walls of brickwork or stonework and girders, beams and floors of reinforced concrete, but do not have reinforced concrete columns. Where only the floor structure of the buildings is made of prefabricated elements they also considered monolithic buildings.

Residential buildings are those initially built or subsequently reconstructed for occupancy by one or more households. The survey includes inhabited and uninhabited residential buildings, summer kitchens (if they are standalone units), hostels, pensions, monasteries and retirement homes inhabited by collective households.

A residential unit is a structurally individualised and standalone space initially built or subsequently reconstructed for residential occupancy, consisting of one or more premises (living or service rooms) and has one or more independent exits to a common area (staircase, yard or directly to a street), regardless of whether it has a purpose-built kitchen. A residential unit is also any standalone space (room) that is not connected to other spaces, has an independent exit to a common area (staircase, yard or directly to a street), and is used both as a kitchen and for living or only for living.

The reported numbers include inhabited and uninhabited but inhabitable residential units: hostels, pensions, monasteries, retirement homes occupied by collective households, summer kitchens provided that they are standalone units and residential units in non-residential buildings (administrative, farm and other buildings such as schoolhouses, hospitals, hotels and military barracks) and provided that they are permanently occupied by households.

A residential unit with two or three floors located in one residential building and occupied by a single household is considered as one residential unit. If each floor of such a building is occupied by a single household, each floor is deemed a separate residential unit.

In hotel-type buildings (corridor system) the rooms inhabited by separate households are considered standalone residential units. In the case of buildings inhabited by collective households (pensions, specialised homes, monasteries, prisons, etc.) all rooms occupied by persons belonging to the collective household and all service rooms used by these persons form one residential unit.

When the residential units are assigned to groups based on the number of rooms, a room is any living room (hall) open to natural light, excluding vestibules, kitchens and rooms with an area below 4 m^2.

The *living area* includes the area of living rooms, bedrooms, sleeping quarters, canteens, dayrooms, rooms used by scholars as work offices and libraries, guestrooms and halls.

The *service area* includes the area of service premises, rooms, kitchens with an area below 4 m^2, vestibules with a portal or other partition, corridors, hallways, bathrooms, toilets, combined bathrooms and toilets, larders, cloakrooms and other service premises (drying rooms, laundry rooms, balconies and loggias) regardless of their area. Kitchen areas include kitchens with an area above 4 m^2.

The *useful area* of a residential unit is the sum total of living, service and kitchen areas.

Primitive residential units include those accommodated in basements or garrets of residential buildings, cabins (assembled from individual boards), huts, buildings deemed unfit for habitation, buildings under construction occupied by workers fitting out the building and so on.

1.2.2 Statistical review of the technical indicators of residential buildings

The technical indicators provide accurate inputs for assessing the overall technical condition, the degree of ammortisation and the potential improvements of the technical characteristics of the buildings. In Bulgaria, the values of the technical indicators are established by audits of the technical characteristics of the buildings pursuant to Regulation No 5 of 2006 on the technical passports of buildings and structures, and by energy efficiency audits carried out in accordance with Article 48 of the ZEE.

The statistical review encompassed indicators which can be assessed on the basis of statistical data only. Consolidated results are provided in Table 1.2.2-1.

Table 1.2.2-1: Consolidated data on residential buildings with a breakdown by structural type

Ref	Structural system	until 2001				until 2011		
		Housing units, count	Useful area m^2	Buildings, count	Spec. area of the building, m^2	Housing units, count	Useful area m^2	Buildings, count
1	Prefabricated panels	707 441	43 859 858.00	18 900	2 321	710 733	50 243 904	21 651
2	Reinforced concrete (MSB, EPK, PPP, PK)	441 892	31 171 701.00	75 333	414	413 179	21 053 819	50 881
3	Brickwork (with a concrete slab) (MSB)	1 025 700	71 511 409.00	578 938	124	1 432 107	87 286 119	706 646
4	Bricks (with trimmer joist) (metal joists)	1 049 355	63 577 389.00	997 775	64	984 578	60 047 857	942 383
5	Stonework	103 652	6 312 322.00	95 306	66	86 261	0	
6	Clay (unbaked bricks)	287 389	14 517 351.00	294 887	49	223 948	0	
7	Timber	39 926	1 391 265.00	39 810	35	24 476	0	

8	Other	23 086	1 002 815.00	23 584	43	8 215	14 553 531	342 267
9	Total	3 678 441	233 344 110	2 124 533		3 887 149	233 185 230	2 042 177

Analysis by structural type

This technical indicator is relevant for the assessment of the overall technical condition and ammortisation time of the load-bearing structure, and of the energy performance of existing residential buildings. The indicator is also used for cost-efficiency analysis in the contexts of technical and energy efficiency audits. The indicator is used to assess the technical standards to which the buildings were constructed and put into service, and of any divergence from the technical standards applicable at present.

Figure 1.2.2-1 presents the distribution of useful living area by the structural type criterion.

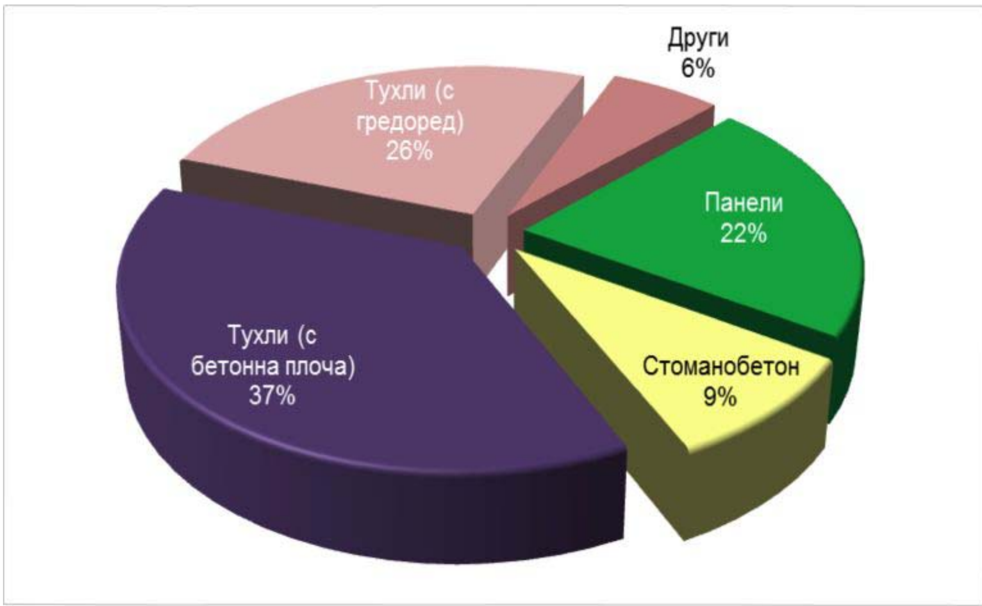

Figure 1.2.2-1: Distribution of useful living area in 2011 by structural system

Key: brickwork (with concrete slabs) 37 %, brickwork (with trimmer joists) 26 %, panel buildings 22 %, reinforced-concrete buildings 9 %, other 6 %.

The analysis demonstrated that four structural systems are prevalent:

- panels (prefabricated panels for residential units);
- reinforced concrete systems: monolithic reinforced concrete, large-area formwork, package-hoisted slabs, creeping formwork (MSB, EPK, PPP, PK);
- brickwork (with concrete slabs) (MSB);
- brickwork (with trimmer joists) (metal joists).

These accounted for 93.8 % of the combined useful area of all residential units in 2011, an increase of 3.3% since 2001. The following analysis of indicators focuses on these four main groups.

Analysis by number of floors

This technical indicator is relevant to appraisals used for the purposes of the Condominium Management Act (ZUES) for estimating the costs related to the maintenance and management of the building as well as for assessing the applicable energy saving measures.

Figure 1.2.2-2 presents the distribution of panel buildings by number of floors.

Residential buildings (count):	21 651
Combined useful area (m^2):	50 243 904

Housing units (count): 710 733

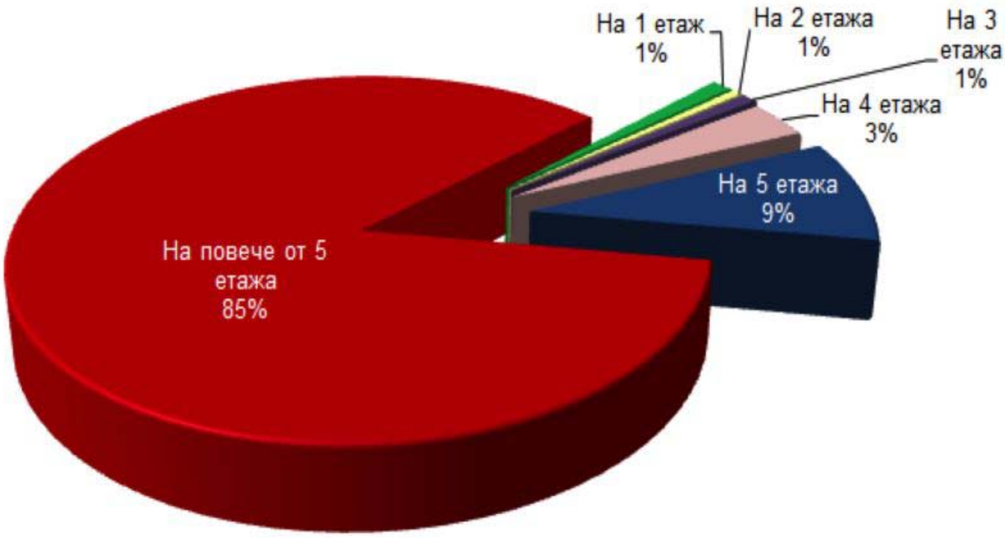

Figure 1.2.2-2: Distribution of residential panel buildings by number of floors

Key: more than 5 floors: 85 %, 5 floors: 9 %, 4 floors: 3 %, 3 floors: 1 %, 2 floors: 1 % and 1 floor: 1 %.

More than 85 % of the panel buildings have more than 5 floors. These buildings are occupied by families of diverse social and cultural status, which largely prevents the proper management either of the common areas or the individual residential units. Energy performance of building envelopes and heating systems is low in these buildings.

Figure 1.2.2-3 presents the distribution of reinforced-concrete buildings by number of floors.

Residential buildings (count):	50 881
Combined useful area (m^2):	21 053 819
Housing units (count):	413 179

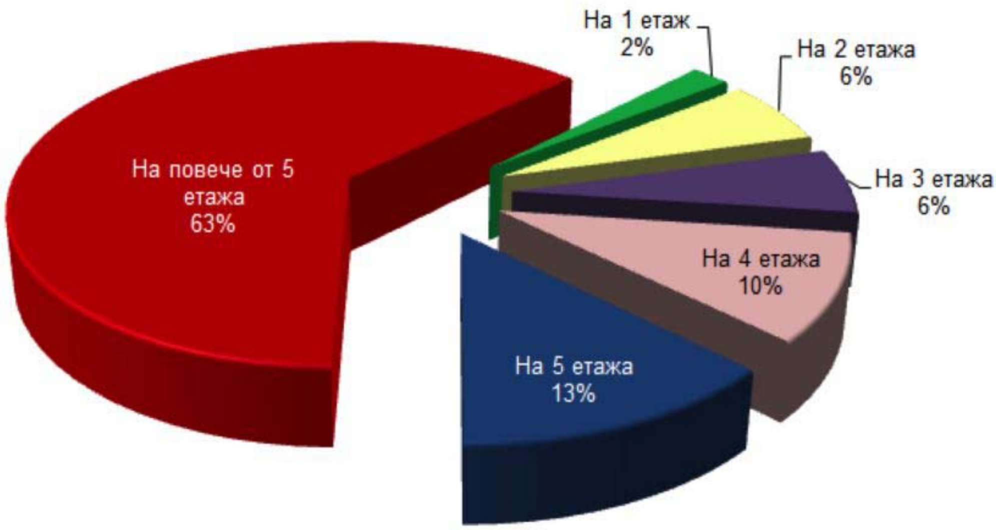

Figure 1.2.2-3: Distribution of reinforced-concrete residential buildings by number of floors

Key: more than 5 floors 63 %, 5 floors 13 %, 4 floors 10 %, 3 floors 6 %, 2 floors 6 % and 1 floor 2 %.

Figure 1.2.2-4 presents the distribution of brickwork buildings (with concrete slabs) by number of floors.

Residential buildings (count):	706 646
Combined useful area (m^2):	87 286 119
Housing units (count):	1 432 107

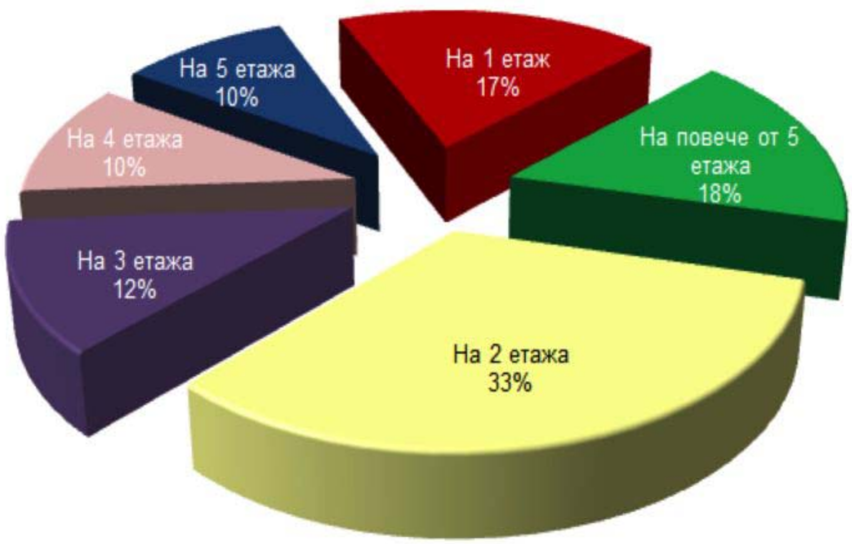

Figure 1.2.2-4: Distribution of brickwork buildings (with concrete slabs) by number of floors

Key: more than 5 floors 18 %, 5 floors 10 %, 4 floors 10 %, 3 floors 12 %, 2 floors 33 % and 1 floor 17 %.

Figure 1.2.2-5 presents the distribution of brickwork buildings (with trimmer joists) by number of floors.

Residential buildings (count):	942 383
Combined useful area (m^2):	60 047 857
Housing units (count):	984 578

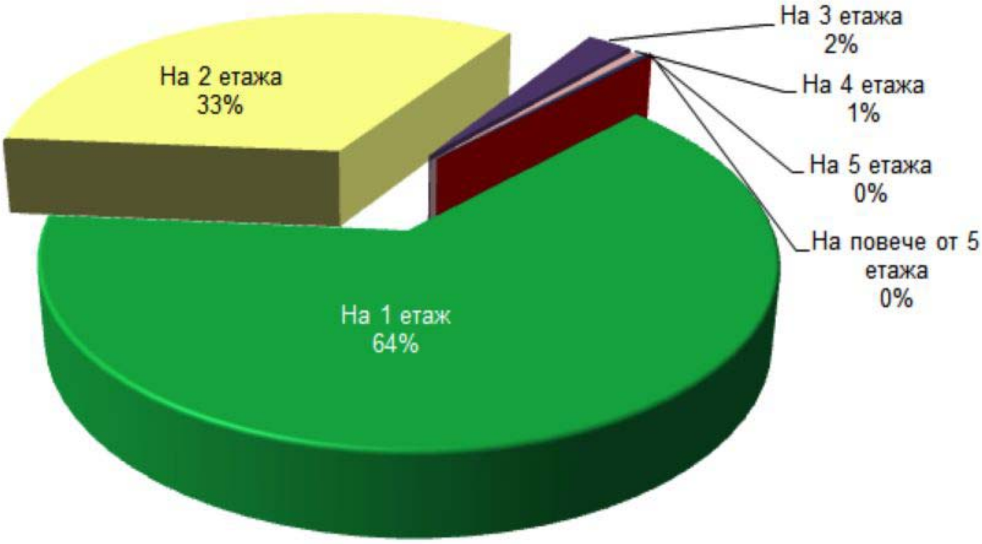

Figure 1.2.2-5: Distribution of brickwork buildings (with trimmer joists) by number of floors

Key: more than 5 floors 0 %, 5 floors 0 %, 4 floors 1 %, 3 floors 2 %, 2 floors 33 % and 1 floor 64 %.

Analysis by age (year of putting into service)

This indicator is relevant for assessing the overall operational condition of the residential building stock and planning of programmes for the renovation of existing residential buildings, including the financial parameters of these programmes. At the level of individual buildings the impact of this indicator on the costs related the building and to residential units in the building are variable since the indicator is strongly influenced by individual factors such as management level, user behaviour, social status of the owners, extent and quality of renovations carried out and climatic conditions in the area.

Figure 1.2.2-6 presents the distribution of residential buildings in Bulgaria by the period in which they are built.

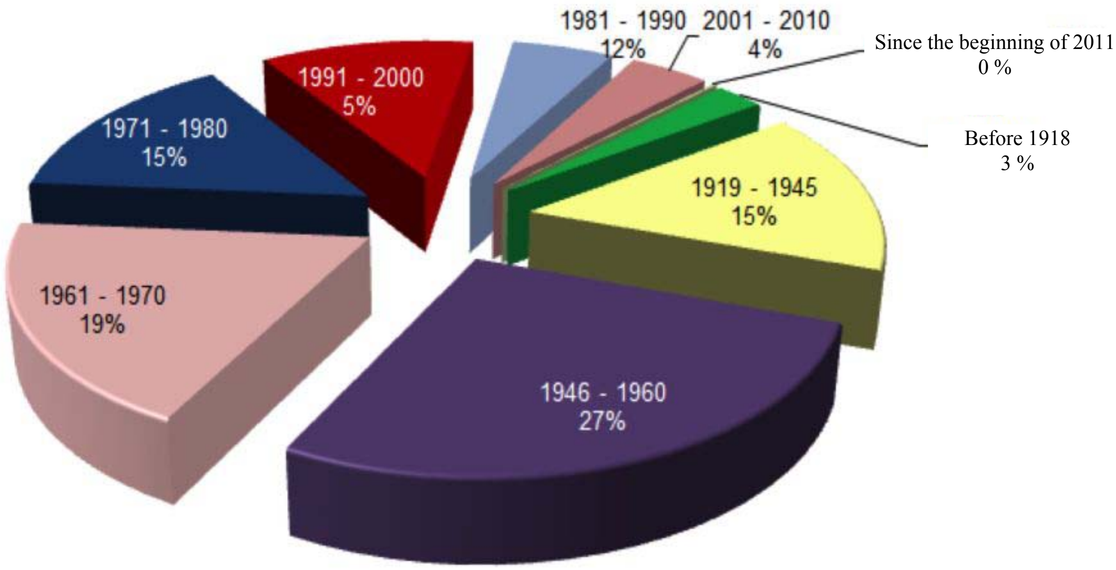

Figure 1.2.2-6: Distribution of residential buildings in Bulgaria by the period in which they were built

Overall condition

Multifamily residential buildings made of large prefabricated panels have emerged as the most disconcerting group in terms of technical degradation. The problems with these buildings have been exacerbated over the years by inadequate management, withdrawal of owners from communal life and collective responsibility for the building, limited or zero maintenance of the common areas in the vast majority of cases, piecemeal and hectic interventions on façades without clear quantitative and qualitative measurement of their effect, frequent non-payment of contributions to a repair and maintenance fund as required by the Condominium Management Act, occupant misbehaviour, lack of financial means for routine and major maintenance, lack of interest in the energy and technical audits required, heterogeneous heating of the housing units, disconnection of heating fixtures in the common areas, low purchasing power, poverty and others. These are only some aspects of the serious decline in the thermal and sanitary comfort of these buildings, leading to a much shorter lifecycle and to a need for serious in-depth engineering assessments.

Many expert assessments and analyses have confirmed that around 10 % of the panel buildings need urgent repair of internal utilities and roof waterproofing systems along with thermal insulation of external walls and replacement of windows and doors.

Analysis by heat-supply system

This indicator is relevant for the energy consumption in buildings and assessment of the level of heating, ventilation and air conditioning technologies used, the serviceability and efficiency of heat generators and of the systems distributing the heat within the buildings, the microclimate parameters maintained and the level of living comfort. The indicator has a direct impact on the quality of life, energy demand and energy costs in residential units, and on addressing the exacerbation of energy poverty.

The assessment is based on a general classification provided in Figure 1.2.2-7.

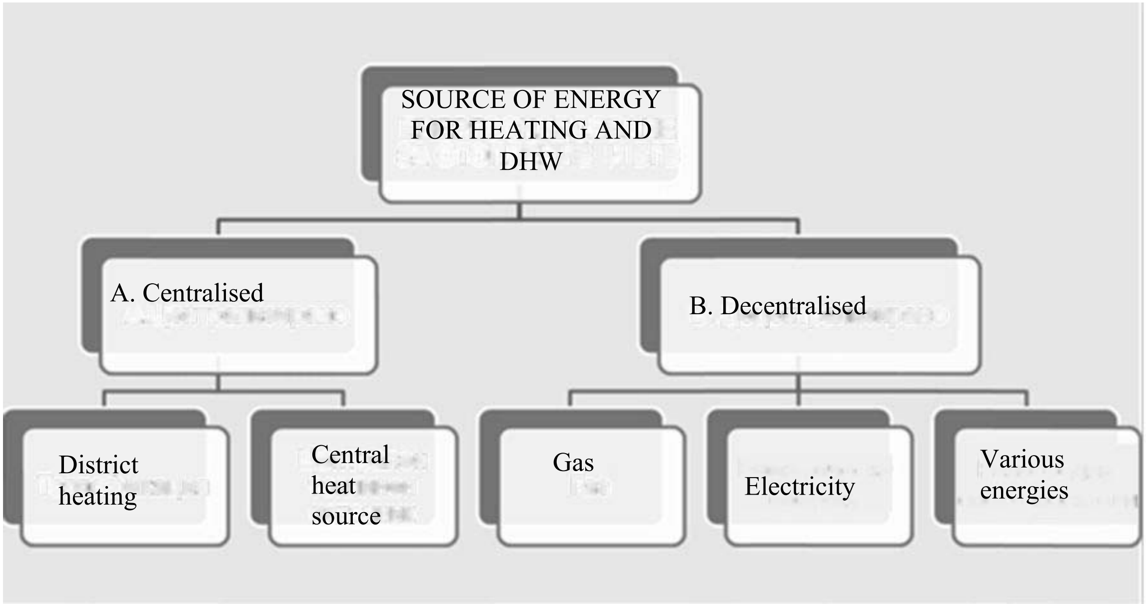

Figure 1.2.2-7 High-level classification[3] of buildings by type of heat-supply system

Although access to energy is a universal right, energy is also a traded commodity. The issues related to energy quality at end-user level and security of the energy supply are therefore of high concern to consumers.

Figure 1.2.2-8 describes the use of various heat-supply systems in residential buildings in Bulgaria.

[3] Source: Technical University of Sofia

Фигура 1.2.2-7: Принципна схема³ на класификацията на сградите по показател „вид на

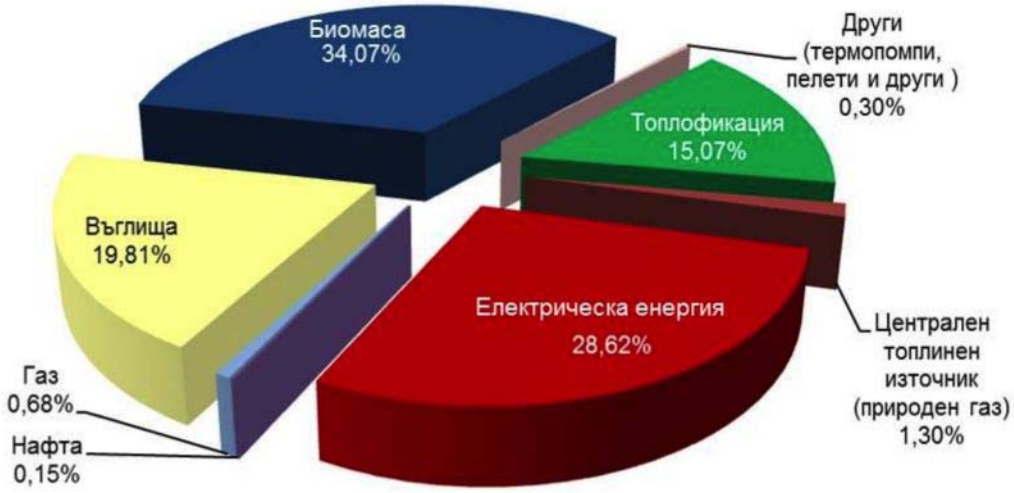

Figure 1.2.2-8 Relative shares of energies/systems used for residential heating in Bulgaria, 2011

Key

Biomass	34.07 %	Heating oil	0.15 %
Electricity	28.62 %	Central heat source (natural gas)	1.30 %
Coal	19.81 %	Gas	0.68 %
District heating	15.07 %	Other (heat pumps, pellets, etc.)	0.30 %

The analysis of statistical data related to the heat supply of 2 666 733 residential units in 2011 revealed a major imbalance in the use of fuels and energies for residential heating. The energy mix is dominated by four sources: biomass, electricity, coal and district heating.

The use of electricity for heating remains relatively high while the use of natural gas for generating heat by combustion in local or district heat sources is marginal. The share of electricity in the final energy consumption of Bulgarian households is the highest in Europe, 39 % against an EU-27 average of 30 %.

Household gasification is making a slow progress. A snapshot for 2016 reveals that the blue fuel is used for heating and other domestic purposes by as few as 2.5 % of Bulgarian households in 20 cities. In a scenario of accelerated gasification, the Bulgarian gas industry expects to deliver gas to 30 % of the Bulgarian population by 2020, i.e. the national consumption of natural gas will rise to 6 billion Nm^3 per year. Conversion from electricity to natural gas in the household sector will lead to major savings of primary energy.

District heating remains the most efficient heating option in cities with developed heat transmission networks, despite the many controversies over the distribution, measurement and reporting of heat in the homes of final users. The service is available in 18 Bulgarian cities. Just 16 % of Bulgarian citizens receive district heating services while in some EU Member States this share varies from 23 % to 64 %. Households use 74 % of the heat supplied by district heating companies. Although the substations in the majority of buildings connected to district heating networks have been replaced and fully modernised, the internal heating systems connected to the substations are in poor condition and much heat is lost in the internal distribution networks due to the characteristics of these condominiums. The common heating systems in multifamily buildings are based on traditional designs. In the majority of buildings they are in poor order, with obsolete elements and pipe networks.

A national system has been introduced for individual reporting (heat allocation) of heat in the standalone units in the buildings. It is difficult to operate this system due to the uneven distribution of heat loads because some subscribers have opted out of the district heating service while others abuse the system by declaring that they have opted out while continuing to use the heat.

The National energy efficiency action plan 2014–2020 also shows that households are the third largest users of energy, with their consumption remaining essentially constant at 2.1–2.2 Mtoe per year. The share of the residential sector in final energy consumption also has also remained constant at 25–26 %. Energy use per residential unit is rising, mostly driven by electricity use, which is growing at a particularly fast rate. The drivers of this tendency have not been examined thoroughly, although one possible explanation is the increasing use of energy for cooling in summertime.

The risk associated with exacerbated energy poverty has been the subject matter of an in-depth analysis of household spending during a period of 15 years, from 1999 to 2014, using data from the NSI. The analysis revealed that during the 15-year period the average household spend is BGN 5 854.64 per year, while consumer spending on this basis is 84.5 % of that figure or BGN 4 948 per year.

Average spending on housing, water, electricity and fuels for residential purposes was 41 % of that for food and non-alcoholic beverages, nearly three times the annual expenditure on healthcare, nearly four times the annual expenditure on culture and education and more than four times the annual expenditure on clothing and shoes. Spending on transport, communications, taxes, cigarettes and alcoholic beverages is roughly equal during the period under consideration.

Figure 1.2.2-9 presents and overview of the average spend of Bulgarian households in 1999–2014.

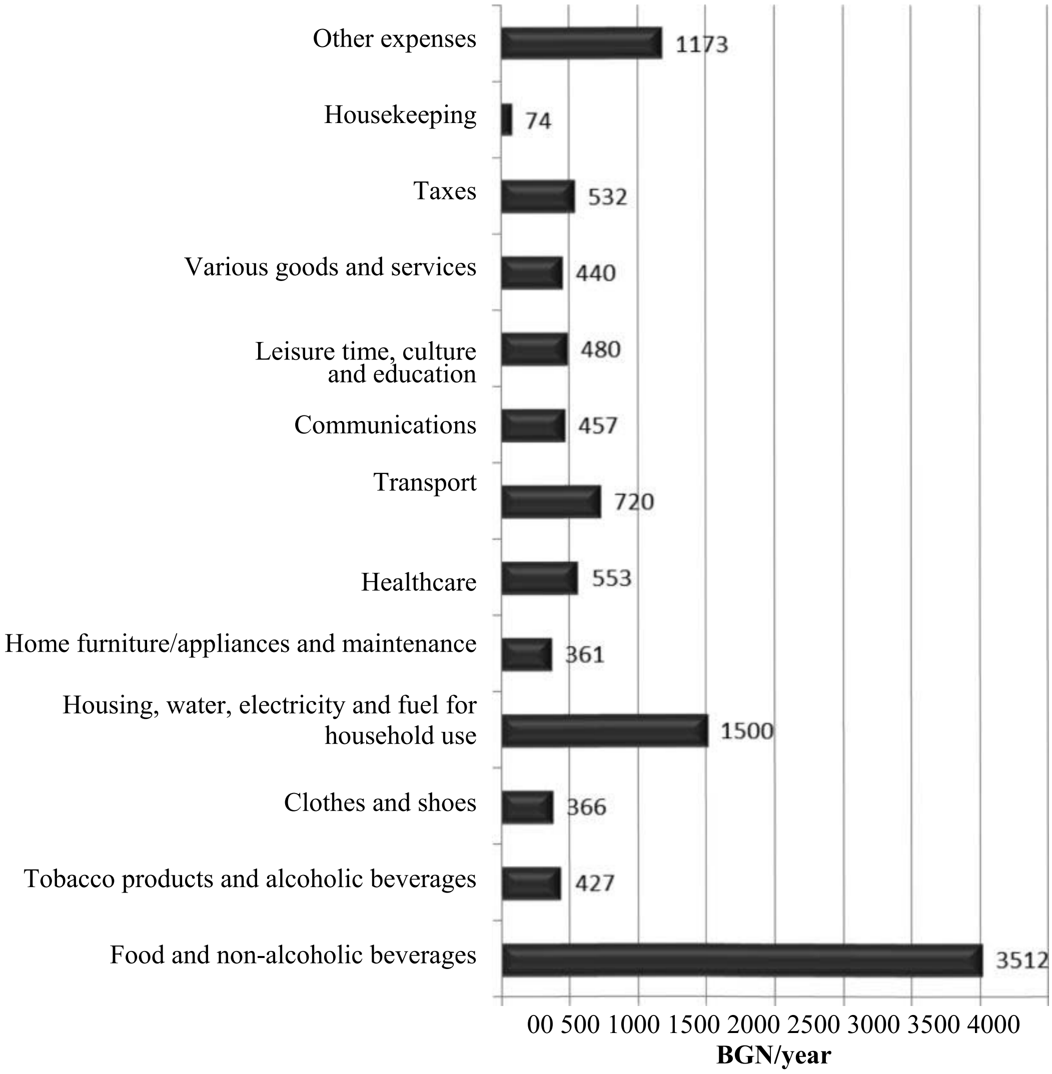

Figure 1.2.2-9 Distribution of household spending by type of expenses, 1999–2014[4]

In the context of the Programme, the above data should be assessed in conjunction with the prices of primary energies, although they are the subject matter of sectoral analyses and forecasts. For an accurate comparison to be made, prices of primary energy sources should be normalised to the energy obtained from them (BGN/kWh or BGN/MWh), with due account taken of conversion efficiency. The prices of energies delivered to end-users as shown on Table 1.2.2-2 are taken as a baseline for the purposes of this document.

[4] The chart excludes loans and other financial borrowing. These would strongly aggravate the annualised results shown.

Table 1.2.2-2: Average prices[5] of energy from the main energy sources in Bulgaria (projection by 2030)

Energy sources	***Price, BGN/MWh***
Gasoil	180
Natural gas	110
Wooden pellets (with an average calorific value of 4 800 kWh/t)	108
District heating	115
Electricity	210

Efficiency in the household sector is measured by the climate-adjusted annual energy demand per housing unit, in toe/housing unit. In recent years this indicator has been on an upward course due to the intense use of electricity both for heating in wintertime and for air conditioning in summertime.

The calculated normalised energy demand of multifamily residential buildings in the coldest climate zones of Bulgaria is 331–395 kWh/m^2 while the European average is 180 kWh/m^2. In primary energy demand, the baseline values are in the range of 365 to 435 kWh/m^2. The primary energy demand is calculated for gasoil and natural gas with an adjustment for losses in extraction/production and transmission e_i=1.1.

These numbers point to a major energy savings potential in the household sector. Accordingly, application of energy saving measures in residential buildings will have a major contribution to the achievement of the national energy efficiency target in the light of the fact that Bulgaria uses the 25 % energy savings allowance at FEC level as permitted by Article 7(2) of Directive 2012/27/EC.

1.2.3 Analysis by social welfare indicators

Basic services

This indicator gauges how the universal right of access to water, energy and sewerage is exercised. It looks at a number of technical metrics and to certain conveniences such as bathroom or toilets, non-leaking roofs or sufficient light, which are complementary to the other criteria by which the quality of a housing unit is measured.

Essentially all Bulgarian homes are electrified except 0.02 % in inaccessible locations not reached by transmission and/or distribution grids. The proportion of housing units not connected to water supply networks is a bit higher, 7.6 %. Drinking water consumption by households accounts for 8 to 10 % of the overall water use in Bulgaria.

While 70.2 % of the urban areas do have sewerage systems, wastewater discharge is a major problem in the other cities or towns. In rural areas, as little as 2.1 % of all villages have sewerage systems. The overall share of the population which has access to sewerage networks in 46 %.

[5] Prices include VAT. Source: Energy strength of Bulgaria by 2020.

Water supply systems in Bulgaria are out-dated and physically impaired, and generate major losses of water. According to the Ministry of Regional Development and Public Works (MRRB) one-third of these systems require major reconstruction or modernisation. The condition of water supply systems has implications on the sanitary properties of drinking water and on sanitation levels in housing units.

More than 70 % of the inhabited units have indoor bathrooms and toilets. The proportion of homes without any toilet, either indoor or outdoor, is negligibly low (1.1 %), and nearly 10 % of the units do not have bathroom facilities.

In order to better inform energy savings policies, the 2011 Census introduced for the first time in Bulgaria systematised data on energy-saving joinery and thermal insulation of housing units. The data reveal that in 29.0 % of the units the original joinery has been replaced by an energy-saving one and 15.5 % of the units have thermal insulation applied on their external walls and accordingly have envelopes of better energy performance. The Census collected only quantitative data without particulars of the energy saving impact of the measures implemented in housing units. Arrangements should therefore be made to collect at a national level details on the energy consumption of households and on the thermal comfort maintained in the housing units as a function of their heat energy use.

A comparison between the two most recent censuses reveals some major developments as regards the extent in which Bulgarian homes are equipped with domestic appliances and equipment. As of 1 February 2011, 97.9 % of the inhabited homes had a TV set, 93.2 % had an electric cooker and 93.3 % had a refrigerator. Computers were available in 54.1 % of urban dwellings and 18.1 % of rural dwellings, while computer penetration in 2001 was as little as 4 % of all inhabited homes. 51.4 % of inhabited urban dwellings and 16.4 % of inhabited rural dwellings had internet access. While only 6 % of all housing units had a satellite antenna in 2001, this percentage rose to 22 % in 2011.

These numbers demonstrate that the number of electrical household appliances in use is rising with the obvious consequence that households tend to use more electricity.

Access to housing

A definition of this concept is provided in Regulation 362/2008/EC. *Accessibility* in this context applies to services which are actually usable by households in financial, physical, mental and health terms. Accessibility relates to the objective and physical reality rather than to subjective perceptions.

The *access to housing* indicator is a key metric of quality of life and of the functioning of the housing market. In the Green Paper on the development of the single market for postal services, accessibility is understood as each citizen *being able to easily pay for the service*.

In addition to being a fundamental need and right of citizens, provision of acceptable housing at affordable prices and in safe environments is expected to reduce poverty and social exclusion. This remains a major, continuing and aggravating challenge for Bulgaria. It has been confirmed that there is a direct link between the general state of the economy and the free housing market in the country.

The 'overcrowding of dwellings' indicator

a) The macroeconomic situation

In its third in-depth review of Bulgaria (SWD (2014) 76 final, 5 March 2014), the European Commission concluded that Bulgaria continues to experience macroeconomic imbalances, stemming in particular from corporate deleveraging combined with continuing adjustment of external positions, competitiveness and labour markets. The recovery in Bulgaria has been slow and the economy continues to operate considerably below potential. After a moderate rebound in 2011, growth has remained under 1 % over 2012-13 and is projected to pick up only slowly over 2014-15 (Commission forecast, 2014).

Table 1.2.3-1: Key economic, financial and social indicators, Bulgaria[6]

Key economic, financial and social indicators—Bulgaria	2007	2008	2009	2010	2011	2012	2013	2014	2015
Real GDP (yoy)	6.4	6.2	-5.5	0.4	1.8	0.8	0.5	1.5	1.8
Private consumption (yoy)	9.0	3.4	-7.6	0.1	1.5	2.6	-0.3	1.3	1.6
Public consumption (yoy)	0.3	-1.0	-6.5	1.9	1.6	-1.4	3.0	2.2	2.1
Gross fixed capital formation	11.8	21.9	-17.6	-18.3	-6.5	0.8	2.1	2.4	4.2
Exports of goods and service (yoy)	6.1	3.0	-11.2	14.7	12.3	-0.4	4.9	3.4	5.5
Imports of goods and services (yoy)	9.6	4.2	-21.0	2.4	8.8	3.7	4.1	3.7	5.9
Output gap	5.3	6.2	-2.2	-2.4	-0.9	-1.0	-1.7	-1.7	-1.6
Contribution to GDP growth:									
Domestic demand (yoy)	9.4	8.5	-12.0	-4.9	-0.3	1.6	0.7	1.7	2.2
Inventories (yoy)	0.9	-0.7	-3.4	-0.4	0.3	1.9	-0.6	0.0	0.0
Net exports (yoy)	-3.8	-1.5	10.0	5.6	1.8	-2.7	0.3	-0.2	-0.4
Current account balance of PoB (% of GDP)	-25.2	-23.1	-8.9	-1.5	0.1	-1.3	.	.	.
Trade balance (% of GDP), PoB	-19.7	-20.6	-8.2	-2.5	0.4	-2.9	.	.	.
Terms of trade of goods and services (yoy)	-0.1	-0.4	1.5	2.5	0.1	-1.3	2.3	0.0	-0.3
Net international investment position (% of GDP)	-81.1	-98.4	-101.8	-95.4	-85.9	-79.7	.	.	.
Net external debt (% of GDP)	32.7	48.9	49.6	43.6	35.2	28.8	.	.	.
Gross external debt (% of GDP)	94.3	105.1	108.3	102.7	94.3	94.9	.	.	.
Export performance vs. advanced countries (5 years % change)	58.4	49.6	28.9	25.1	25.9	15.8	.	.	.
Export market share, goods and services (%)	0.1	0.2	0.1	0.1	0.2	0.2	.	.	.
Savings rate of households (net saving as percentage of disposable income)	-34.5	-22.6	-4.4	-5.1	.	.	.	.	.
Private credit flow (consolidated, % of GDP)	43.4	34.7	5.1	3.3	1.7	2.5	.	.	.
Private sector debt (consolidated, % of GDP)	130.1	137.9	143.0	140.5	133.4	131.8	.	.	.
							.	.	.
Deflated house price index (yoy)			-20.4	-10.2	-5.5	-1.9	.	.	.
							.	.	.
Residential investment (% of GDP)	5.3	6.1	5.3	2.8	2.4	.	.	.	.
Total Financial Sector Liabilities, non-consolidated (% of GDP)	29.3	-0.8	1.3	-1.7	4.9	10.1	.	.	.
Tier 1 ratio (1)	11.6	13.0	17.5	16.5	14.9	14.6	.	.	.
Overall solvency ratio (2)	13.9	14.9	17.0	17.4	17.6	16.6	.	.	.
Gross total doubtful and non-performing loans (% of total debt instruments and total loans and advances) (2)	3.3	4.8	11.5	17.9	19.7	19.8	.	.	.
Employment, persons (yoy)	3.2	2.6	-2.6	-4.7	-3.4	-4.3	-1.0	0.2	0.5
Unemployment rate	6.9	5.6	6.8	10.3	11.3	12.3	12.9	12.4	11.7
Long-term unemployment rate (% of active population)	4.1	2.9	3.0	4.8	6.3	6.8	.	.	.
Youth unemployment rate (% of active population in the same age group)	14.1	11.9	15.1	21.8	25.0	28.1	.	.	.
Activity rate (15–64 years)	66.3	67.8	67.2	66.5	65.9	67.1	.	.	.
Young people not in employment, education or training (% of total population)	19.1	17.4	19.5	21.8	21.8	21.5	.	.	.
People at-risk poverty or social exclusion (% of total population)	60.7	44.8	46.2	49.2	49.1	49.3	.	.	.
At-risk poverty rate (% of total population)	22.0	21.4	21.8	20.7	22.2	21.2	.	.	.
Severe material deprivation rate (% of total population)	57.6	41.2	41.9	45.7	43.6	44.1	.	.	.

[6] Source: SWD (2014) 76 final, 5 March 2014

People living in households with very low work intensity (% of total population)	15.9	8.1	6.9	7.9	11.0	12.4	.	.	.
GDP deflator(yoy)	9.2	8.4	4.3	2.8	4.9	2.2	2.9	1.9	2.2
Harmonised index of consumer prices (yoy)	7.6	12.0	2.5	3.0	3.4	2.4	0.5	1.4	2.1
Compensation of employees/head (yoy)									
Labour productivity (real, person employed, yoy)	3.2	3.7	-3.8	4.4	4.1	3.4	0.7	0.8	2.6
Unit labour costs (whole economy, yoy)	9.3	12.6	12.4	5.2	2.5	-0.5	2.0	2.3	2.1
Real unit labour costs (yoy)	0.1	3.8	7.7	2.4	-2.2	-2.6	-0.9	0.4	-0.1
REER (ULC, yoy)	7.1	9.0	10.2	3.2	4.0	-4.2	2.5	1.9	.
REER (HICP, yoy)	4.7	8.6	4.0	-2.9	1.0	-2.0	0.0	0.4	.
Government balance (% of GDP)	1.2	1.7	-4.3	-3.1	-2.0	-0.8	-2.0	-2.0	-1.8
Structural budget balance (% of GDP)	-0.5	-0.3	-3.6	-2.2	-1.7	-0.4	-1.5	-1.5	-1.3
General government gross debt (% of GDP)	17.2	13.7	14.6	16.2	16.3	18.5	19.4	22.6	24.1

(1) domestic banking groups and stand-alone banks

(2) domestic banking groups and stand-alone banks, foreign (EU and non-EU) controlled subsidiaries and foreign (EU and non-EU) controlled branches

Source: Eurostat, ECB, AMECO.

b) Demographics

The demographic and social situation is watched closely by the NSI and Eurostat due to alarming trends and messages issued by this domain. Eurostat predicts that in 2010–2060 Bulgaria will lose almost 27 % of its population and the share of people older than 65 years will reach and exceed 32.6 %. Children under 15 will be as little as 13 % of the Bulgarian population. The World Bank foreshadowed another negative trend, namely that in 2012–2050 Bulgaria's active population will be vanishing at the fastest rate worldwide. The most disconcerting expectations indicate that in the same period Bulgaria will lose 41 % of the population aged 15 to 24. These heavily pessimistic forecast will affect directly the educational sector, labour market, quality of workforce, and Bulgaria's economy as a whole.

The demographic grid clearly indicates that there is a major and long-lasting imbalance in population density across Bulgaria. The territorial distribution of population across regions, provinces and municipalities is also uneven. Against this backdrop, the free market for housing is affected, both demand-wise and supply-wise, by domestic migration and the related socioeconomic development or rather decline of certain regions, employment opportunities offered by the various regions, living conditions and opportunities for social inclusion.

c) Free domestic market for housing

A review of market information and research papers related to the housing market and housing loans in Bulgaria was undertaken in order to better inform the formulation of residential policies and priorities going forward.

In the wake of the financial crisis, property sales in Bulgaria took a downward course which began in 2009 and continued for five years. This period hardly saw any sales of residential property off-plan or at early stages of construction as tepid interest in these transactions did not emerge before 2013. While the housing market began an uneasy rebound in 2013, its main feature remains 'supply prevails over demand'. Real estate agents reported that in early 2014 housing prices were at 10-year lows, while financial institutions were already offering better terms for the provision of new mortgage loans or for the restructuring of existing ones.

As the economic situation has begun to improve, economic uncertainty has eased off. Home buyers are increasingly looking for best price/quality ratios which indicates that consumer demand is somewhat on the move. Against this minor improvement; however, housing affordability remains unfeasible as more people are unable to buy a home on their own money without resorting to a bank loan.

In 2014, the prices of newly-built housing units ranged from EUR 800 to EUR 1 200 per square metre without VAT depending on quality of execution, location and extent of fit-out works to be completed after the sale. The housing market is best developed in Sofia, Varna, Burgas and Plovdiv, but elsewhere the market has ground to a standstill.

Unlike housing prices, average rent prices have remained stable within the range of EUR 3.5 to EUR 6.5 per square meter per month. The housing rent market is steady with minor ups and downs of the demand curve. Sofia remains the primary destination of housing rent seekers.

In the present market situation, money-backed demand covers as little as 8–10 % of Bulgarian citizens' want for own homes, and maximum 10 % of the actual demand for privately rented homes. Choices are very limited. The classic indicators which measure housing affordability are way above, or much worse, compared to other EU Member States. For example, while in 2002 an average household needed 6.1 annual incomes in order to buy a 75 m^2 unit, in 2013 a home of 73 m^2 would cost 10.43 annual incomes (figure 1.2.3-1). In Sofia; however, it takes a lot more annual incomes to buy similar housing space. In the EU this indicator ranges from 2.5 to 4.

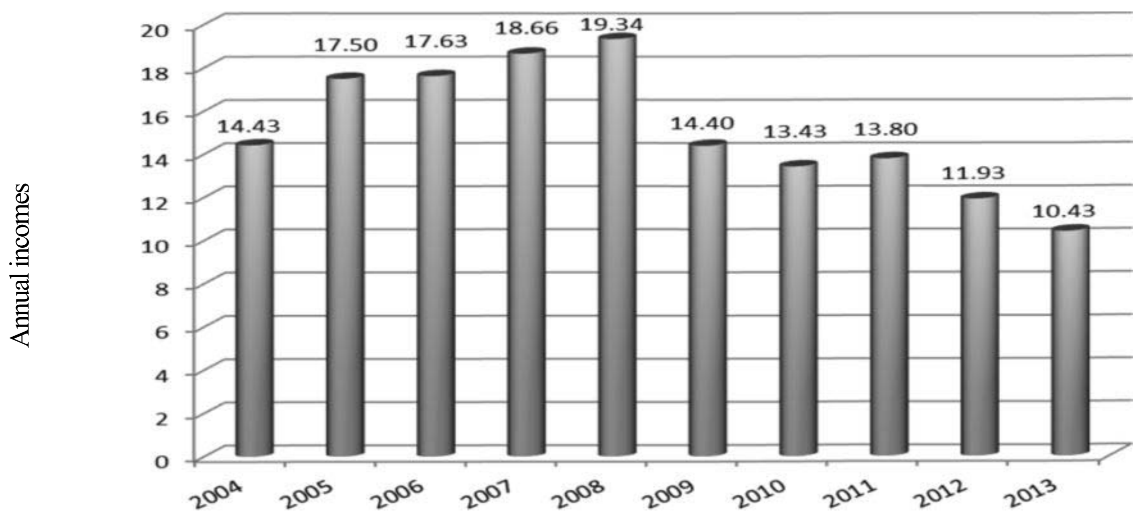

Figure 1.2.3-1: Average annual incomes[7] required to buy a housing unit of 73 m^2

Affordability of rent fees in the private sector does not look better. An average-income household in a medium city would spend half of their income on renting a two-room apartment, while housing allowances in the balanced economies keep this indicator below 30 %.

[7] The estimate does not apply to new construction, but only to transactions with existing properties.

Figure 1.2.3-2 displays average market prices of homes other than new construction

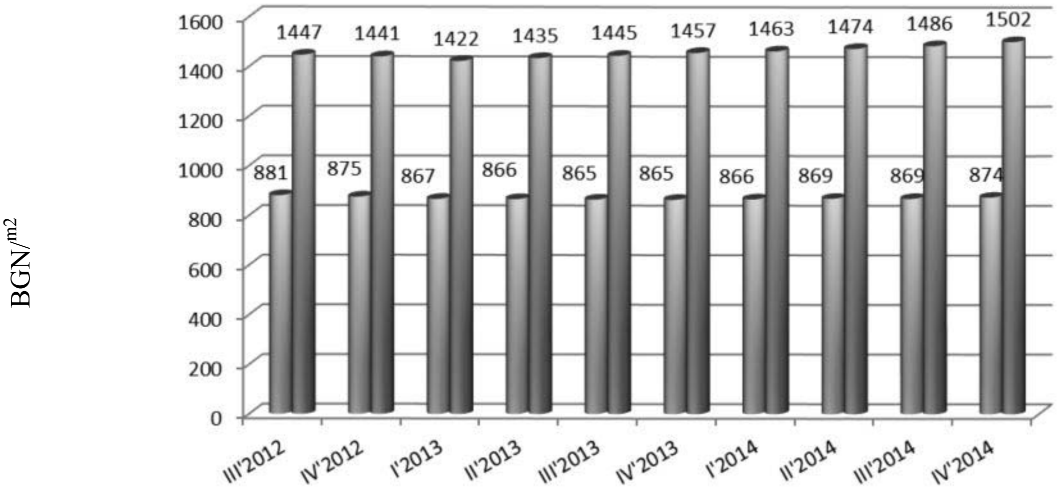

Figure 1.2.3-2: Housing market prices[8] by quarter, country average (lower bars) and Sofia average (tall bars), 2012–2014

The market nature of the housing offering service and evolving competition have led to the emergence of new value propositions in recent years, such as letting of fully furnished homes, maintenance and repair of individual units or entire buildings, and cost management. This service package is steadily present in the Bulgarian market for a several years already. This is a new model, which reflects new market trends in the building management area and responds better to the more demanding requirements and preferences of wealthier consumers. Provision of this service package is not regulated in Bulgarian housing legislation and is exclusively market-based at present.

A market survey of facility services among providers which have published the prices of their building management packages established that as of 31 December 2013 the average prices gravitated around BGN 1.51 per square meter of GFA depending on the package selected by the client. This price does not include the 'salaried house manager' service provided in some condominium buildings.

d) Commercial banks

The information in this part of the report is based on *Sectoral analysis of the competitive environment in the retail banking sector*, a paper issued by the Commission for the Protection of Competition. The analysis is based on Article 7(1)(5) of the Competition Protection Act (ZZK) and aims to present an overview of the retail banking market from two perspectives: (i) the extent of competition and transparency in the market and the environment in which it operates, and (ii) does it afford sufficient benefits to consumers. The analysis responds to a strong

[8] Source: NSI

socioeconomic and public interest, which in turn stems from the role of retail banking in the household sector, especially as regards the provision of bank accounts and loans.

The analysis confirmed that all banks based in Bulgaria operate in the retail banking market. Even the largest players do not have market shares amounting to a dominant position in the meaning of the ZZK. The analysis indicated that

> 'the factors which influence the offering of housing loans are very similar to those driving the offering of consumer loans. The main differences relate to the banks' policies of entry and investment in the real estate market, the better quality of collateral and the lower interest rates for mortgage-secured housing loans. A housing loan is intended for the purchase of real property and is secured by a legally binding mortgage on the property to be purchased or on another property of the applicant (known as 'contractual mortgage'). These loans typically support the purchase of an existing property/building or part of a building, or of a housing unit under construction. Housing loans can also be provided for the construction of individual houses or for the purchase of land. On the demand side, the most-sought loans are those for the purchase of existing properties (typically apartments) in large cities. These loans prevail in credit portfolios and come with the longest repayment periods, between 20 and 35 years. 72 % or more of the mortgage-secured housing loans in Bulgaria are provided to people in working age and in employment. The average customer borrows from EUR 30 000 to EUR 50 000 and earns BGN 500–BGN 1 000 per month. Borrowers increasingly ask for longer-term mortgage loans with a view to reducing their monthly instalments'.

The above quote foretells that a controversial reality may be unfolding. In the long term, households with mortgage loans will spend increasing proportions of their income towards debt service, which will have a significant and long-lasting impact on family budgets. This creates a plausible risk of poverty during the loan period, in particular where one or more family members are affected by unemployment. The longer repayment period defers the liability in instalments which the borrower can afford; however, it flags the unaffordability of the mortgaged home, i.e. borrowers fall in the group of *vulnerable consumers* as soon as they receive their loans. This risk factor is understudied, adequate legislation is lacking and many people lose their homes because of intermediate debt service difficulties or inability to pay the full price.

According to a forecast of credit consultants, in 2014–2016 activity in the various segments of the credit market has increased by as much as 8 % and mortgage interest rates are on a gradual downward course. Families with young children form the largest group of borrowers (ca. 47 %).

Eurostat ranks Bulgaria among the Member States with the highest poverty rates, together with Latvia (21.3 %), Romania (21.1 %), Greece (20.1 %), Lithuania (20.2 %) and Spain (20.7 %). In the last seven years earnings of the wealthiest have been 5.9 times the earnings of the poorest.

Overcrowding is a key indicator for the assessment of the quality of living conditions and the poverty risk. The indicator reflects the proportion of people living in overcrowded homes. Whether a home is overcrowded depends on a range of factors such as number of rooms available to the household, size of the household, and age/family status of household members. Figure 1.2.3-3 presents a Eurostats analysis of the quality of living and the positioning of Bulgaria among the rest of Europe.

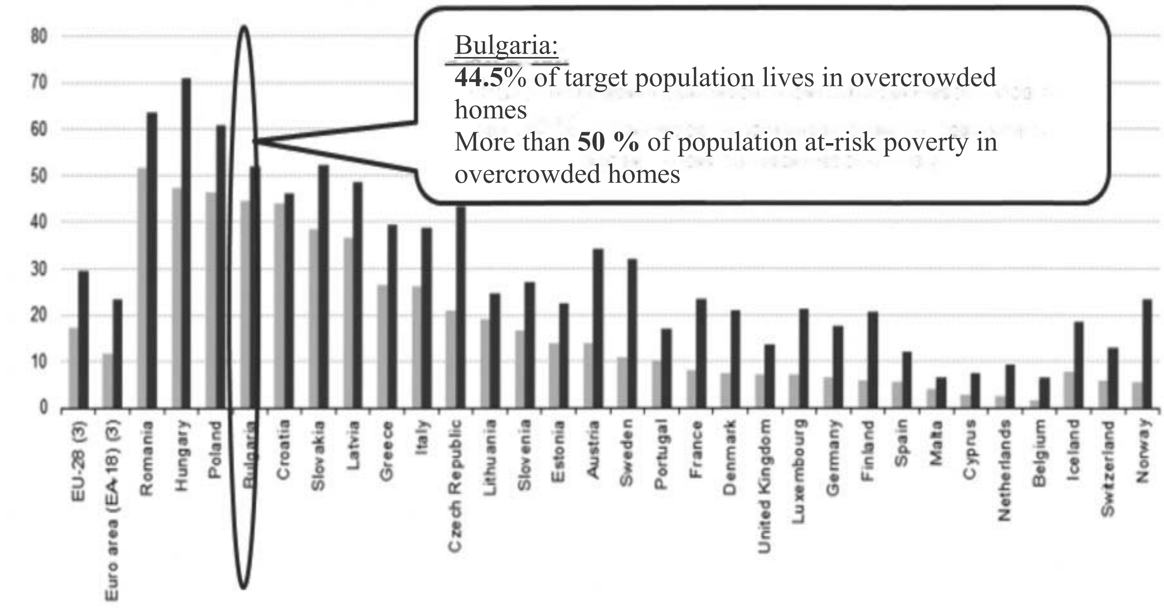

Figure 1.2.3-2: Quality of living[9] in Bulgaria and in the EU

As seen from the chart, Bulgaria ranks among the worst-performing countries both by overcrowding and at-poverty risk together with Romania (51.6 %), Hungary (47.2 %), Poland (46.3 %) and Croatia (44.1 %).

The estimated useful area per capita per dwelling as of December 2013 was 39.53 m^2. The country-average useful area per dwelling at the same time-point was 73.10 m^2, with less than half of it being living area (30.01 m^2) or 40.58 % of the useful area (the rest being service area).

[9] Source: Eurostat

Housing sufficiency

Housing sufficiency is a quantitative indicator which measures the extent to which the available building stock meets the actual housing requirements at a macro level. It is expressed in *number of dwellings per 1 000 occupants*. Unless combined with other parameters, its informative capacity is limited as it does not depict the qualitative characteristics of the counted dwellings. Against the demographic backdrop of Bulgaria, a country-average value may be misleading. The analysis revealed that for the indicator to be calculated correctly, the NSI data should be processed by a specific method, which requires data differentiation different from the published one. It would be appropriate to base this indicator on the number of lastingly occupied dwellings, i.e. those used for permanent living, rather than on the total number of dwellings (inhabited + uninhabited). The indicator should also be adjusted to the demographic profile of the particular region or settlement for which assessments and forecasts are developed. Furthermore, the very concept of *uninhabited dwellings* should be refined and adequately adapted for the purposes of the national provisions.

Example: Pursuant to Directive 2010/31/EU, residential buildings used for their intended purpose for less than four months in a year are excluded from the national energy efficiency requirements; however, this derogation does not treat the buildings concerned as *uninhabited*. In Bulgaria, these typically include private villas, summer or winter vacation homes, seasonal buildings, etc. Generally, these buildings should not be counted as uninhabited; however, their seasonal use means they should not be included in the base count used for calculating the *number of dwellings per 1 000 occupants* indicator, because their inclusion improperly elevates the baseline and the results are largely astray of reality.

If this specificity is taken on-board and only inhabited dwellings are included in the base count, value of the indicator would become more realistic: 362 dwellings per 1 000 occupants, which is below the European average of 420/1 000. If the example above is taken into account, this value can be interpreted as shortage of homes, i.e. as a case of housing insufficiency.

According to an update of the National Demographic Strategy of Bulgaria 2012–2030, the average number of occupants per dwelling is 2.1 in urban areas and 1.5 in rural areas. The most densely occupied homes are found in the provinces of Blagoevgrad (2.3 occupants), Plovdiv, Pazardzhik and Sliven (2.1). An average dwelling in Sofia is occupied by 2.0 persons. The provinces with most loosely occupied homes are Pernik (1.4 occupants), Burgas, Vidin, Gabrovo and Montana (1.5).

1.3 The energy profile of buildings in Bulgaria

For the purpose of determining energy performance, the building is regarded as an integrated system and its energy consumption is a function of the combined effect of the following main components:

- ✓ envelope components of the building
- ✓ microclimate systems
- ✓ internal heat sources
- ✓ occupants
- ✓ climatic conditions.

Figure 1.3-1 provides a graphic illustration of the concept used for determining the energy performance of buildings.

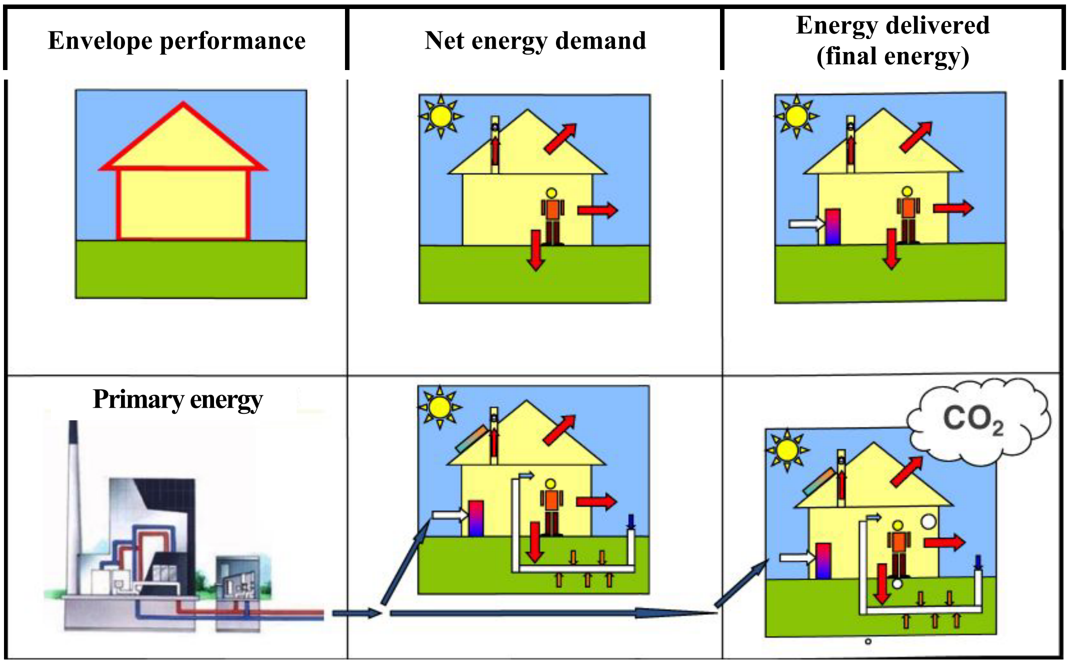

Figure 1.3-1: Determining the energy performance of buildings[10]

Energy profiling of buildings in Bulgaria is based on a selected subset of key energy-use indicators:

<u>Group 1:</u> Indicators which describe the energy-conversion and energy-transmission properties of building envelopes and microclimate systems:

- Heat transmission factor, external walls (U, W/m^{2}K)
- Heat transmission factor, windows (U, W/m^{2}K)
- Efficiency rating of the generator of heating/cooling energy (%)

[10] Source: Technical University of Sofia

Group 3: Indicators which characterise the energy-use of the building as a whole:

- Gross annual consumption per square metre of energy for heating, cooling, ventilation, DHW, lighting and appliances, an integrated indicator measured in kWh/m^2.

1.3.1 Energy profiling of the buildings by the heat transmission factors of their external walls and windows, U, W/m^{2}K

This assessment looks at the combined impact of the indicators *U-value* (U, W/m^{2}K) and *year of putting into service* (see section 1.2 above). A review of the construction and technical standards applicable at various times of the period 1959–2015 was carried out. An analysis of the results revealed that many buildings in Bulgaria were put into service between 1959 and 1977, i.e. they have been in use for more than 40 years.

Table 1.3.1-1 Distribution of buildings by functional use and period of putting into service

	Period in which the building was put into service							
Functional use of the building	Before 1959	1959–1977	1977–1980	1980–1987	1987–1999	1999–2005	2005–2010	After 20 20
Administrative building	21.3 %	33.4 %	7.8 %	15.3 %	12.5 %	4.9 %	2.9 %	1.9 %
Hospital (inpatient and outpatient care)	26.6 %	21.1 %	9.1 %	18.4 %	15.2 %	3.5 %	1.6 %	4.5 %
Kindergarten or nursery	6.8 %	46.2 %	14.8 %	20.7 %	9.0 %	0.2 %	1.3 %	1.1 %
Social home (for children or retirees)	15.0 %	39.2 %	5.1 %	11.0 %	6.1 %	11.3 %	7.8 %	4.5 %
Building in the area of culture and art	25.0 %	24.9 %	9.8 %	27.8 %	7.8 %	3.3 %	0.4 %	1.0 %
Hostel	6.9 %	46.0 %	7.2 %	18.0 %	19.0 %	2.1 %	0.8 %	0.0 %
School	27.1 %	46.2 %	5.5 %	13.3 %	7.1 %	0.4 %	0.4 %	0.0 %
Library/community centre	22.5 %	61.3 %	7.0 %	7.0 %	1.6 %	0.2 %	0.4 %	0.0 %
Outpatient clinic	21.3 %	28.9 %	8.4 %	24.5 %	14.4 %	0.9 %	0.0 %	1.6 %
University/college	15.7 %	33.3 %	13.6 %	14.0 %	16.4 %	1.7 %	1.4 %	3.9 %
Building intended for sport	2.3 %	31.7 %	8.8 %	32.1 %	18.2 %	1.0 %	4.3 %	1.7 %
Building in the area of commerce or hotel-keeping (recreation centre)	9.6 %	35.7 %	23.6 %	21.5 %	3.7 %	0.0 %	4.5 %	1.4 %
Building in the area of transport	0.0 %	33.9 %	0.0 %	8.1 %	45.8 %	0.0 %	0.0 %	12.2 %
Residential buildings	42.0 %	19.0 %	15.0 %	12.0 %	5.0 %	4.0 %	0.01 %	3.0 %

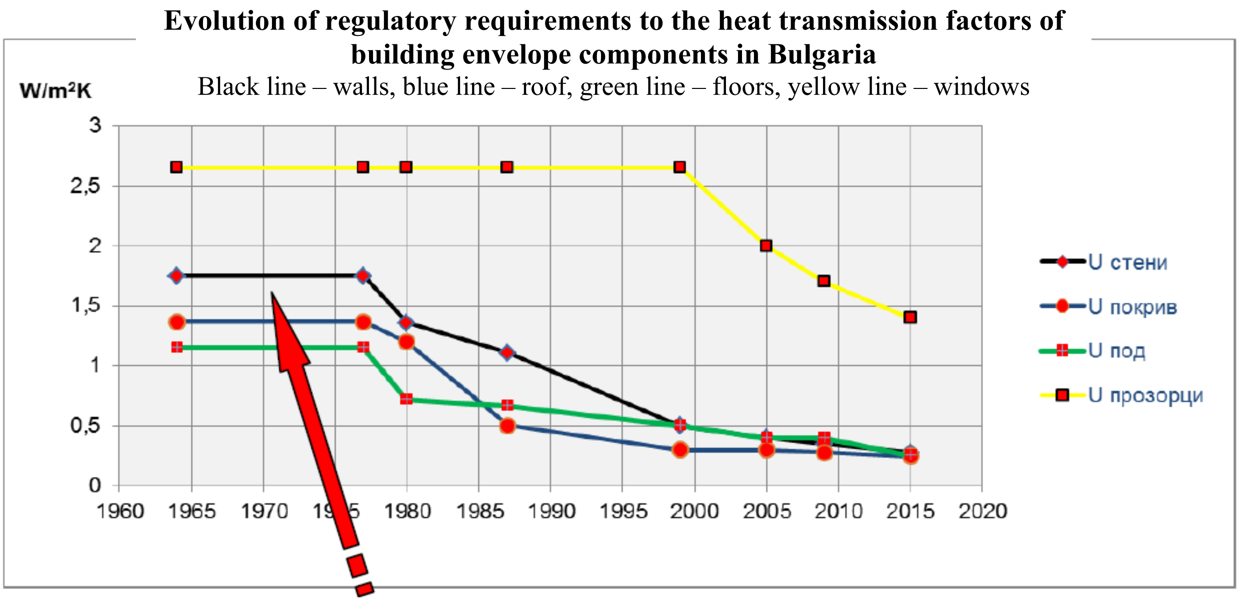

Figure 1.3.1-1: Regulatory requirements to the heat transmission factors of building envelopes in Bulgaria

Many buildings were put into service in 1959–1977 in accordance with the standards prevailing at that time, and ten years later, by 1987, the heat transmission factors of their walls and windows were 1.75–1.11 W/m^{2}K and respectively 2.65 W/m^{2}K. Due to long-time use of these buildings and increasing infiltration through joinery, the heat transmission factors of the walls and windows of non-ESM buildings can be as high as 3.5 W/m^{2}K, thus heat losses through walls and windows account for most of the heat which escapes through envelopes (70 %–85 %) followed by roof structures. Priority therefore should be given to measures to improve the energy performance of envelopes, especially of the buildings in which ES measures have not been applied at all.

Table 1.3.1-2: Energy profile of the buildings based on the heat transmission factors of their walls and windows (U, W/m^{2}K)

Envelope component	*Standards applicable in 1959–1977*	*Standard applicable as of 2015*	*Divergence, %*
Walls	1.75÷1.11	0.28	80 %
Windows	2.65	1.4÷1.7	42 %

1.3.2 Energy profiling of the buildings by the efficiency rating of heating/cooling energy generators, η (%)

This assessment examines the combined impact of the indicators *efficiency rating of the generator of* *heating/cooling energy* (η, %) and *type of heating/cooling system* (see section 1.2 above).

The results from energy audits carried out in various climate zones of Bulgaria and in buildings using various heat supply sources were subjected to an expert analysis. Comparability was ensured by taking into account only buildings the heat sources of which are identical with the ones used for the *type of heating/cooling system* analysis.

Table 1.3.2-1: Energy profile of the buildings based on the efficiency ratings of heating/cooling energy generators, %

Energy source	***Efficiency rating of heat generators with the existing condition of the buildings***	***Minimum rating required by standards currently in force[11]***	***Divergence, %***
Gasoil	65÷80 %	87.8 % for standard boilers 90.4 % for low-temperature boilers	18 %
Coal	55÷65 %	87.8 % for standard boilers	32 %
Biomass	45÷55 %	82 % for natural-draught boilers	39 %
Natural gas	80÷87 %	93 % for condensation boilers 96 % for upgraded condensation boilers	12 %

1.3.3 Energy profiling by the integrated indicator Gross annual consumption per square metre of energy for heating, cooling, ventilation, DHW and appliances (kWh/m^2)

The energy consumption of a building is calculated on the basis of its one-month energy balance, wherein the building is treated as an integrated system. This approach requires the use of non-fixed and fixed components of energy flows across the entire tract, from heat exchange in the heated/cooled space to the transmission/distribution system and finally to the energy generator/converter. Regulation No 7 of 2004 on the energy efficiency of buildings sets out a scale of energy consumption classes of 10 building categories. The scale is developed in accordance with BDS EN 15217 and with the requirements laid down in the methodological framework provided by Commission Delegated Regulation (EU) No 244/2012 of 2012 supplementing Directive 2010/31/EU 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

11 The technical requirements stated in the table are not exhaustive. All technical requirements are set out in Regulation No 7/2004 on the energy performance of buildings.

building elements (OJ L 81/18 of 21 March 2012).

Gross annual consumption per square metre of energy for heating, cooling, ventilation, DHW and appliances (kWh/m^2) is the key indicator for assessing the energy efficiency level of a building. It provides the most holistic energy profile of the building from energy-use perspective.

Table 1.3.3-1 presents the energy profiles of various types of buildings by *Gross annual consumption per square metre of energy for heating, cooling, ventilation, DHW and appliances* (kWh/m^2).

Table 1.3.3-1: Energy profile of buildings[12] by Gross annual consumption per square metre of energy for heating, cooling, ventilation, DHW and appliances (kWh/m^2)

EXPECTED ENERGY SAVINGS AFTER RENOVATION/NEW CONSTRUCTION IN EACH CATEGORY (per energy-consumption class)	Savings following renovation **from class F to class B**		Savings following renovation **from class E to class B**		**NZEB** savings compared to class B
	Primary energy	Final energy	Primary energy	Final energy	Primary energy
	kWh/m^2	kWh/m^2	kWh/m^2	kWh/m^2	kWh/m^2
Administrative buildings	340.00	170.85	240.00	120.60	105.50
Healthcare buildings	409.00	205.53	296.50	148.99	105.50
Cultural and art buildings	275.00	138.19	195.00	97.99	83.00
Kindergartens	260.00	130.65	195.00	97.99	49.00
Hotels	350.00	175.88	240.00	120.60	128.00
Residential buildings	256.50	128.89	184.00	92.46	71.50
Sport buildings	356.50	179.15	244.00	122.61	131.50
Commercial buildings	481.50	241.96	319.00	160.30	206.50
Schools	145.00	72.86	105.00	52.76	38.00
Universities	222.50	111.81	157.50	79.15	68.00
State-owned buildings	286.86	144.15	204.71	102.87	82.93

[12] Source: Technical University of Sofia

2. DEFINING ECONOMICALLY EFFICIENT APPROACHES FOR IMPROVING THE ENERGY PERFORMANCE OF BUILDINGS

This Programme sets out economically efficient scenarios for improving the energy performance of buildings. The assessment is based on a quantitative assessment of energy, environment and financial indicators of costs and benefits, obtained by a modelling study followed by an economic analysis (in accordance with the methodology framework in Commission Delegated Regulation (EU) No 244/2012) of the following reference buildings:

- single-family buildings
- multifamily buildings
- administrative buildings
- healthcare buildings
- schools
- kindergartens
- universities
- culture and art building
- sport building
- hotels
- commercial buildings

at the following conditions:

- ✓ basic heat supply scenario: district heating, gasoil;
- ✓ climate factors: Zone 7 (continental climate) and zone 1 (sea climate)
- ✓ real interest rate: 3 %, 4.5 % and 6 %
- ✓ energy price escalation: 1 % p.a., 2 % p.a
- ✓ product price escalation: 0.5 % p.a.

Packages of energy-saving measures in combinations tailored for each building were assessed for each scenario in accordance with the relevant requirements laid down in Directive 2010/31/EU. Table 2-1 indicates the key features of the individual energy-saving measures included in the scenarios.

Table 2-1 Parameters of the individual energy-saving measures

No	Ref.	Level	ESM	Parameter	Value
1	B1.1	1	Replacement of windows and doors	U_{win}	1.4
	B1.2	2	Replacement of windows and doors	U_{win}	1.1
	B1.3	3	Replacement of windows and doors	U_{win}	0.9
2	B2.1	1	Thermal insulation of walls	U_w	0.25
	B2.2	2	Thermal insulation of walls	U_w	0 22
	B2.3	3	Thermal insulation of walls	U_w	0.15
3	B3.1	1	Thermal insulation of roof	U_r	0.28
	B3.2	2	Thermal insulation of roof	U_r	0.22
	B3.3	3	Thermal insulation of roof	U_r	0.15
4	C1	C1	Central heating (substation)		
5	C2	C2	Installation of biomass-fired boiler (pellet plant)		
6	C3.1	1	Installation of gas-fired boiler	η	0.93
	C3.2	2	Installation of gas-fired boiler	η	1.03
7	C4	C5	Installation of boiler fired by liquid fuel		
8	C5.1	1	Installation of direct evaporation heat pump	COP/EER	4/3.5
	C5.2	2	Installation of direct evaporation heat pump	COP/EER	5/4
	C5.3	3	Installation of direct evaporation heat pump	COP/EER	5.5/5
9	C6	C6	Installation of water-water heat pump		
10	C7	C7	Installation of ground-water heat pump		
11	C8	C8	Central heating		
12	C9.1	1	Installation of air-air heat pump	COP/EER	3.5/3
	C9.2	2	Installation of air-air heat pump	COP/EER	4/3.5
	C9.3	3	Installation of air-air heat pump	COP/EER	4.5/4
13	C10	C10	Installation of water-air heat pump		
14	C11	C11	Installation of ground-air heat pump		
15	C12	C12	Heat recuperation		
16	C13	C13	Central heating		
17	C14	C14	Installation of biomass-fired boiler (pellet plant)		
18	C15	C15	Installation of gas-fired boiler		
19	C16	C16	Installation of ground-water heat pump		
20	C17	C17	Installation system to utilise solar heat		
21	C18.1	1	Air-water air cooler	EER	3.5
	C18.2	2	Air-water air cooler	EER	4
	C18.3	3	Air-water air cooler	EER	5
22	C19	1	Installation of water-water heat pump		
23	C20	1	Installation of direct-evaporation heat pump		
24	C21	1	Energy efficient lighting		

The economic analysis of the scenarios is made using the indicator 'present value of the global costs' over a calculation period of 30 years, with an assessment of sensitivity to interest rates and escalation of product/energy prices.

The simulation and subsequent economic analysis of the global costs led to the identification of the boundaries of the investments (without VAT) required for the implementation of energy saving measures designed to achieve Class B and the corresponding environmental benefits:

- Investments required to achieve Class B requirements: BGN 100–200/m^2 GFA;
- CO_2 emission savings following renovation against the 1999 baseline: 11–19 kg CO_2/m^2 GFA.

2.1 Buildings owned by the State and municipalities

According to the information maintained in the AUER database, as of 1 January 2016 there were 5 660 non-renovated State and municipal buildings (non-ESM buildings) of combined GFA 9 162 308 m^2. Six potential scenarios for the renovation of these buildings were developed on the basis of two assumptions regarding the basis on which renovation can proceed:

- Fixed basis whereby the renovation effort extends to different proportions (5 %, 10 % or 7 %) of all non-ESM GFA as of 1 January 2016, or 9 162 308 m^2, regardless of how much non-ESM GFA remains in each year. These are scenarios A2, B2 and C2;
- Floating basis whereby the renovation effort extends to different proportions (5 %, 10 % or 7 %) of the non-ESM GFA remaining as of 1 January of the next year. These are scenarios A1, B1 and C1.

- ✓ SCENARIO A1: Renovate 5 % of the non-ESM GFA remaining as of 1 January of the next year;
- ✓ SCENARIO A2: Renovate 5 % of all non-ESM GFA as of 1 January 2016;
- ✓ SCENARIO B1: Renovate 10 % of the non-ESM GFA remaining as of 1 January of the next year;
- ✓ SCENARIO B2: Renovate 10 % of all non-ESM GFA as of 1 January 2016;
- ✓ SCENARIO C1: Renovate 7 % of the non-ESM GFA remaining as of 1 January of the next year;
- ✓ SCENARIO C2: Renovate 7 % of all non-ESM GFA as of 1 January 2016.

Separate analyses of the scenarios were conducted for the two main estates, State-owned buildings and buildings belonging to municipalities.

State-owned buildings

According to the parameters of the State-owned buildings occupied by central government and included in the National plan for the improvement of the energy performance of heated and/or cooled buildings occupied by the State administrative, the non-ESM buildings in this group are 993 with a combined GFA of 2 329 174 m^2. Figure 2.1-1 indicates how much State-owned GFA can be renovated in each scenario over various time spans.

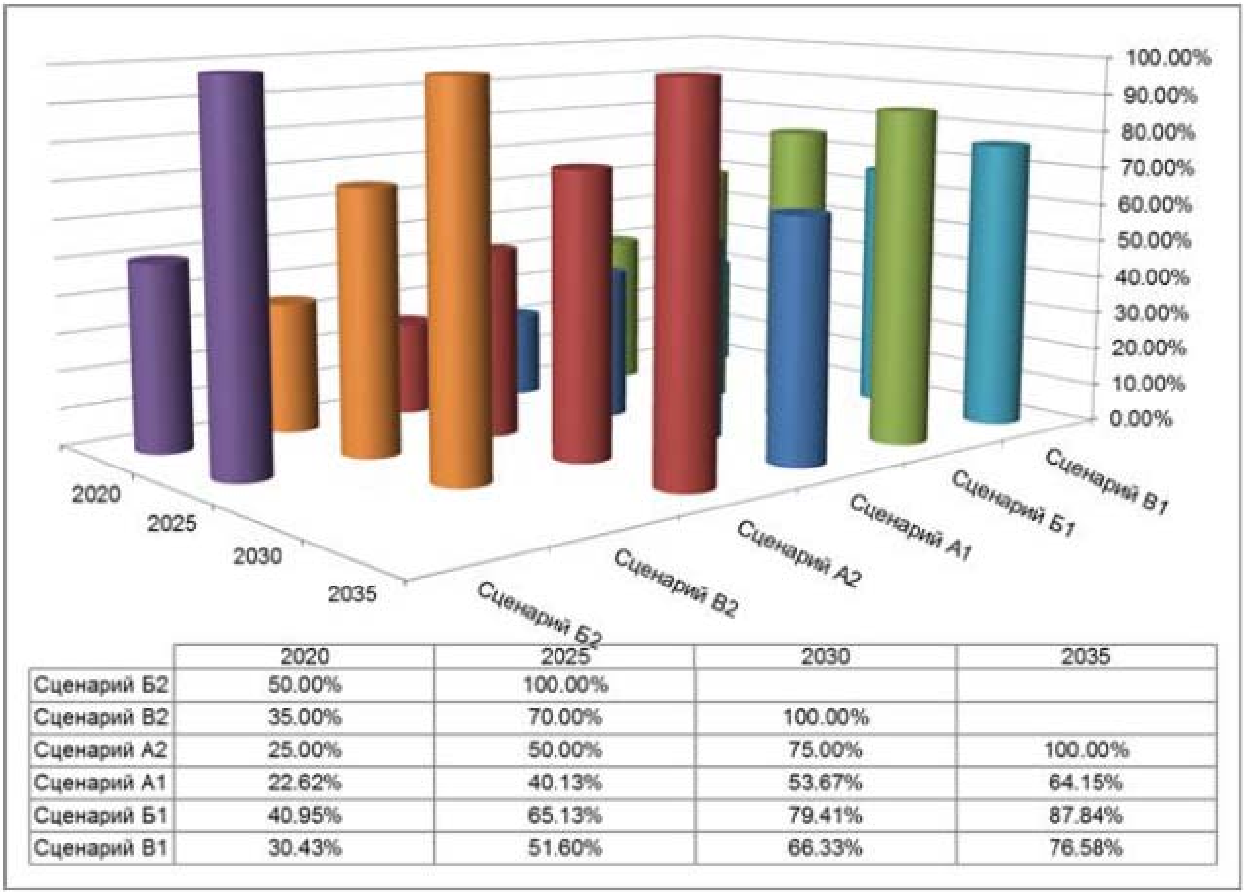

Figure 2.1-1: Cumulative rate of GFA renovation in the group of State-owned buildings

Key

	2020	2025	2030	2035
Scenario B2 (purple bars)	50.00 %	100.00 %		
Scenario C2 (brown bars)	35.00 %	70.00 %	100.00 %	
Scenario A2 (Bordeaux bars)	25.00 %	50.00 %	75.00 %	100.00 %
Scenario A1 (dark blue bars)	22.62 %	40.13 %	53.67 %	64.15 %
Scenario B1 (green bars)	40.95 %	65.13 %	79.41 %	87.84 %
Scenario C1 (pale blue bars)	30.43 %	51.60 %	66.33 %	76.58 %

The numbers demonstrate that only three scenarios can achieve 100 % renovation of the building stock in this group by 2035.

Table 2.1-1 presents estimated results by 2020 in the six scenarios for State-owned buildings excluding those occupied by central government.

Table 2.1-1: Performance achieved in each scenario for the renovation of State-owned buildings excluding those occupied by central government

SCENARIO A1: Renovate 5 % of the remaining non-ESM GFA					
	State-owned buildings excluding those occupied by central government				
Year	GFA, m^2	Investments, BGN	Savings (FEC and emissions)		
			ktoe	GWh	t CO_2
2016	116 459	17 468 808	1.24	14.38	1 746.88
2017	110 636	16 595 368	1.18	13.66	1 659.54
2013	105 104	15 765 599	1.12	12.98	1 576.56
2019	99 849	14 977 319	1.06	12.33	1 497.73
2020	94 856	14 228 453	1.01	11.72	1 422.85
Total	**526 904**	**79 035 547**	**12.77**	**148.54**	**18 039.83**

SCENARIO A2: Renovate 5 % of all non-ESM GFA as of 01.01.2016					
	State-owned buildings excluding those occupied by central government				
Year	GFA, m^2	Investments, BGN	Savings (FEC and emissions)		
			ktoe	GWh	t CO_2
2016	116 459	17 468 808	1.24	14.38	1 746.88
2017	116 459	17 468 808	1.24	14.38	1 746.88
2018	116 459	17 468 808	1.24	14.38	1 746.88
2019	116 459	17 468 808	1.24	14.38	1 746.88
2020	116 459	17 468 808	1.24	14.38	1 746.88
Total	**582 294**	**87 344 040**	**13.61**	**158.22**	**19 215.69**

SCENARIO B1: Renovate 10 % of the remaining non-ESM GFA					
	State-owned buildings excluding those occupied by central government				
Year	GFA, m^2	Investments, BGN	Savings (FEC and emissions)		
			ktoe	GWh	t CO_2
2016	232 917	34 937 616	2.47	28.77	3 493.76
2017	209 626	31 443 854	2.23	25.89	3 144.39
2018	188 663	28 299 469	2.00	23.30	2 829.95
2019	169 797	25 469 522	1.80	20.97	2 546.95
2020	152 817	22 922 570	1.62	18.87	2 292.26
Total	**953 820**	**143 073 031**	**24.01**	**279.19**	**33 907.31**

SCENARIO B2: Renovate 10 % of all non-ESM GFA as of 01.01.2016					
	State-owned buildings excluding those occupied by central government				
Year	GFA, m^2	Investments, BGN	Savings (FEC and emissions)		
			ktoe	GWh	t CO_2
2016	232 917	34 937 616	2.47	28.77	3 493.76
2017	232 917	34 937 616	2.47	28.77	3 493.76
2018	232 917	34 937 616	2.47	28.77	3 493.76
2019	232 917	34 937 616	2.47	28.77	3 493.76
2020	232 917	34 937 616	2.47	28.77	3 493.76
Total	**1 164 587**	**174 688 079**	**27.21**	**316.45**	**38 431.38**

SCENARIO C1: Renovate 7 % of the remaining non-ESM GFA					
	State-owned buildings excluding those occupied by central government				
Year	GFA, m^2	Investments, BGN	Savings (FEC and emissions)		
			ktoe	GWh	t CO_2
2016	163 042	24 456 331	1.73	20.14	2 445.63
2017	151 629	22 744 388	1.61	18.73	2 274.44
2013	141 015	21 152 281	1.50	17.42	2 115.23
2019	131 144	19 671 621	1.39	16.20	1 967.16
2020	121 964	18 294 608	1.30	15.06	1 829.46
Total	**708 795**	**106 319 229**	**17.44**	**202.83**	**24 632.93**

SCENARIO C2: Renovate 7 % of all non-ESM GFA as of 01.01.2016					
	State-owned buildings excluding those occupied by central government				
Year	GFA, m^2	Investments, BGN	Savings (FEC and emissions)		
			ktoe	GWh	t CO_2
2016	163 042	24 456 331	1.73	20.14	2 445.63
2017	163 042	24 456 331	1.73	20.14	2 445.63
2018	163 042	24 456 331	1.73	20.14	2 445.63
2019	163 042	24 456 331	1.73	20.14	2 445.63
2020	163 042	24 456 331	1.73	20.14	2 445.63
Total	**815 211**	**122 281 655**	**19.05**	**221.51**	**26 901.96**

Buildings belonging to municipalities

According to the information available in the AUER database, the buildings in this group are 3 825 with a combined GFA of 5 341 458 m^2.

Figure 2.2-2 indicates how much municipality-owned GFA can be renovated in each scenario over various time spans.

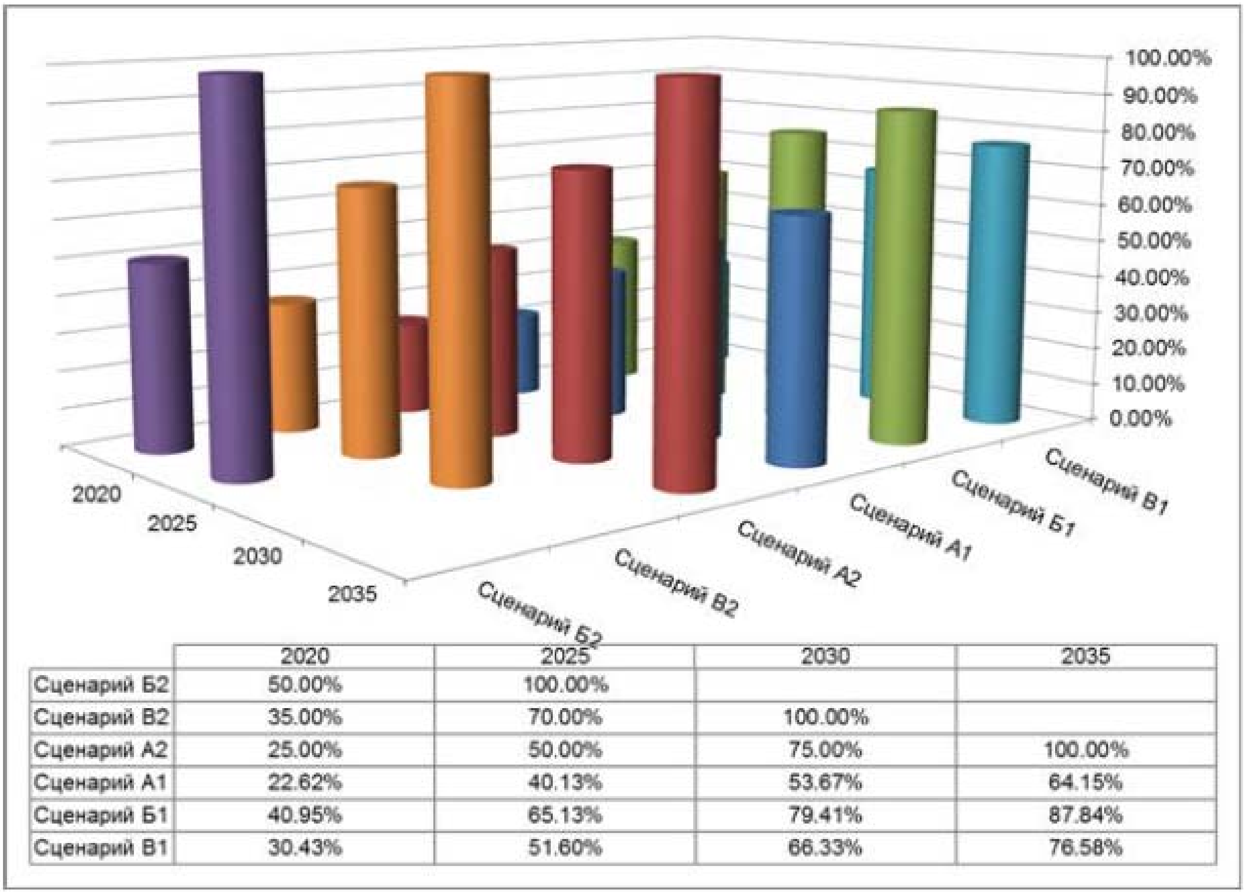

Figure 2.2-2: Cumulative rate of GFA renovation in buildings belonging to municipalities

Key

	2020	2025	2030	2035
Scenario B2 (purple bars)	50.00 %	100.00 %		
Scenario C2 (brown bars)	35.00 %	70.00 %	100.00 %	
Scenario A2 (Bordeaux bars)	25.00 %	50.00 %	75.00 %	100.00 %
Scenario A1 (dark blue bars)	22.62 %	40.13 %	53.67 %	64.15 %
Scenario B1 (green bars)	40.95 %	65.13 %	79.41 %	87.84 %
Scenario C1 (pale blue bars)	30.43 %	51.60 %	66.33 %	76.58 %

Similar to State-owned buildings, the numbers demonstrate that only three scenarios can achieve 100 % renovation of the building stock in this group by 2035.

Table 2.2-2 presents estimated results by 2020 in the six scenarios for municipal buildings.

Table 2.2-2: Performance achieved in each scenario for the renovation of municipal buildings

SCENARIO A1: Renovate 5 % of the remaining non-ESM GFA						SCENARIO A2: Renovate 5 % of all non-ESM GFA as of 01.01.2016					
	Buildings owned by municipalities						Buildings owned by municipalities				
Year	GFA, m^2	Investments, BGN	Savings (FEC and emissions)			Year	GFA, m^2	Investments, BGN	Savings (FEC and emissions)		
			ktoe	GWh	t CO_2				ktoe	GWh	t CO_2
2016	267 073	40 060 931	2.84	32.99	4 006.09	2016	267 073	40 060 931	2.84	32.99	4 006.09
2017	253 719	38 057 885	2.69	31.34	3 805.79	2017	267 073	40 060 931	2.84	32.99	4 006.09
2013	241 033	36 154 991	2.56	29.77	3 615.50	2018	267 073	40 060 931	2.84	32.99	4 006.09
2019	228 982	34 347 241	2.43	28.28	3 434.72	2019	267 073	40 060 931	2.84	32.99	4 006.09
2020	217 533	32 629 879	2.31	26.87	3 262.99	2020	267 073	40 060 931	2.84	32.99	4 006.09
Total	**1 208 340**	**181 250 927**	**29.30**	**340.65**	**41 370.45**	**Total**	**1 335 364**	**200 304 657**	**31.20**	**362.85**	**44 067.02**
SCENARIO B1: Renovate 10 % of the remaining non-ESM GFA						**SCENARIO B2: Renovate 10 % of all non-ESM GFA as of 01.01.2016**					
	Buildings owned by municipalities						Buildings owned by municipalities				
Year	GFA, m^2	Investment s, BGN	Savings (FEC and emissions)			Year	GFA, m^2	Investment s, BGN	Savings (FEC and emissions)		
			ktoe	GWh	t CO_2				ktoe	GWh	t CO_2
2016	534 146	80 121 863	5.67	65.97	8 012.19	2016	534 146	80 121 863	5.67	65.97	8 012.19
2017	480 731	72 109 677	5.11	59.38	7 210.97	2017	534 146	80 121 863	5.67	65.97	8 012.19
2018	432 658	64 898 709	4.60	53.44	6 489.87	2018	534 146	80 121 863	5.67	65.97	8 012.19
2019	389 392	58 408 838	4.14	48.09	5 840.88	2019	534 146	80 121 863	5.67	65.97	8 012.19
2020	350 453	52 567 954	3.72	43.28	5 256.80	2020	534 146	80 121 863	5.67	65.97	8 012.19
Total	**2 187 380**	**328 107 040**	**55.06**	**640.27**	**77 759.07**	**Total**	**2 670 729**	**400 609 314**	**62.41**	**725.70**	**88 134.05**
SCENARIO C1: Renovate 7 % of the remaining non-ESM GFA						**SCENARIO C2: Renovate 7 % of all non-ESM GFA as of 01.01.2016**					
	Buildings owned by municipalities						Buildings owned by municipalities				
Year	GFA, m^2	Investment s, BGN	Savings (FEC and emissions)			Year	GFA, m^2	Investment s, BGN	Savings (FEC and emissions)		
			ktoe	GWh	tCO_2				ktoe	GWh	t CO_2
2016	373 902	56 085 304	3.97	46.18	5 608.53	2016	373 902	56 085 304	3.97	46.18	5 608.53
2017	347 729	52 159 333	3.69	42.95	5 215.93	2017	373 902	56 085 304	3.97	46.18	5 608.53
2013	323 388	48 508 179	3.43	39.94	4 850.82	2018	373 902	56 085 304	3.97	46.18	5 608.53
2019	300 751	45 112 607	3.19	37.15	4 511.26	2019	373 902	56 085 304	3.97	46.18	5 608.53
2020	279 698	41 954 724	2.97	34.55	4 195.47	2020	373 902	56 085 304	3.97	46.18	5 608.53
Total	**1 625 468**	**243 820 147**	**40.00**	**465.14**	**56 490.29**	**Total**	**1 869 510**	**280 426 520**	**43.69**	**507.99**	**61 693.83**

2.2 Residential buildings

As of 1 January 2016, the combined GFA of non-renovated residential buildings (non-ESM buildings) was 232 865 230 m^2. Six potential scenarios for the renovation of these buildings were again developed on the basis of two assumptions regarding the basis on which renovation can proceed:

- Fixed basis whereby the renovation effort extends to different proportions (1 %, 1.5 % or 2.5 %) of all non-ESM GFA as of 1 January 2016, or 1 489 117 m^2, regardless of how much non-ESM GFA remains in each year. These are scenarios A2, B2 and C2;
- Floating basis whereby the renovation effort extends to different proportions (1 %, 1.5 % or 2.5 %) of the non-ESM GFA remaining as of 1 January of the next year. These are scenarios A1, B1 and C1.

✓ SCENARIO A1: Renovate 1 % of the non-ESM GFA remaining as of 1 January of the next year;

✓ SCENARIO A2: Renovate 1 % of all non-ESM GFA as of 1 January 2016;

✓ SCENARIO B1: Renovate 1.5 % of the non-ESM GFA remaining as of 1 January of the next year;

✓ SCENARIO B2: Renovate 1.5 % of all non-ESM GFA as of 1 January 2016;

✓ SCENARIO C1: Renovate 2.5 % of the non-ESM GFA remaining as of 1 January of the next year;

✓ SCENARIO C2: Renovate 2.5 % of all non-ESM GFA as of 1 January 2016.

Figure 2.2-1 indicates how much residential GFA can be renovated in each scenario over various time spans.

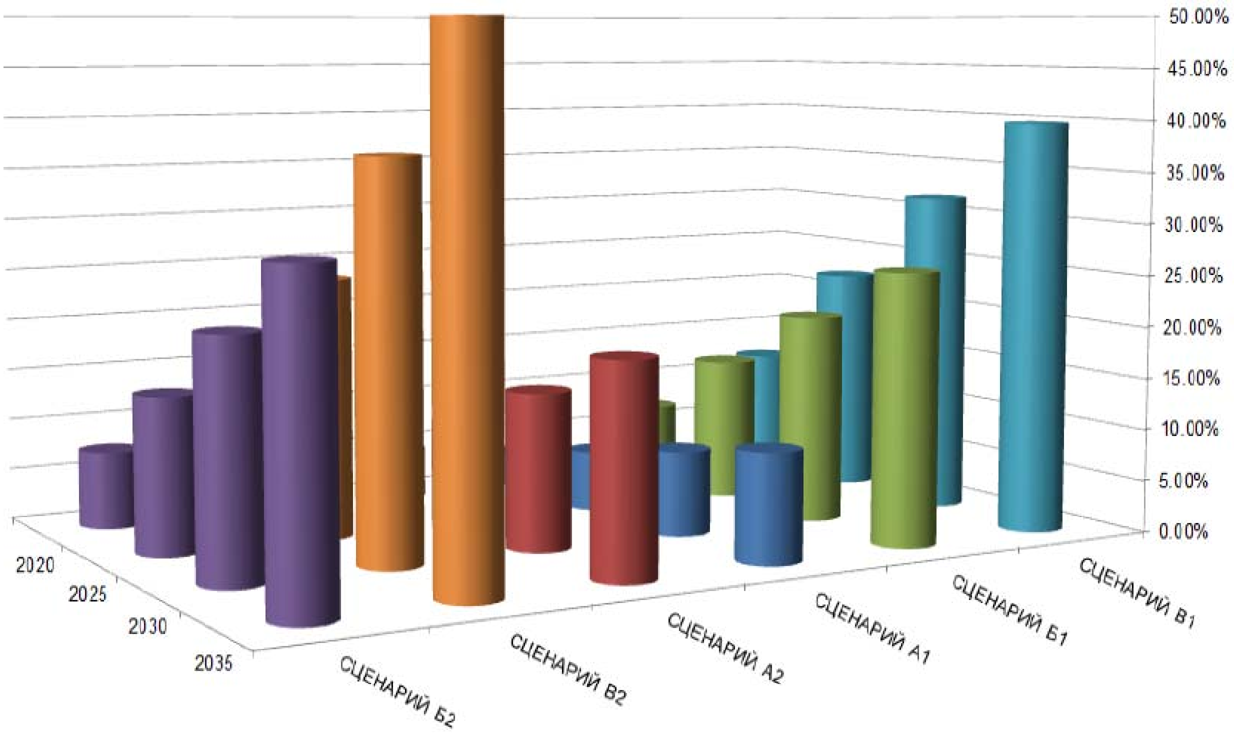

Figure 2.2-1: Cumulative rate of GFA renovation in the group of residential buildings

Key

	2020	2025	2030	2035
Scenario B2 (purple bars)	7.50 %	15.00 %	22.50 %	30.00 %
Scenario C2 (brown bars)	12.50 %	25.00 %	37.50 %	50.00 %
Scenario A2 (Bordeaux bars)	5.00 %	10.00 %	15.00 %	20.00 %
Scenario A1 (dark blue bars)	3.45 %	5.84 %	8.17 %	10.45 %
Scenario B1 (green bars)	7.28 %	14.03 %	20.28 %	26.09 %
Scenario C1 (pale blue bars)	11.89 %	22.37 %	31.60 %	39.73 %

Scenario A2 emerges as the most appropriate one to implement. This scenario will renovate 5 % of the non-ESM residential GFA by 2020. The other scenarios (except A1) are more optimistic and can be applied in case the first review of progress with the Programme identifies unsatisfactory performance under Scenario A2.

Table 2.2-1 displays the estimated performance by 2020 in the six scenarios for residential buildings.

Table 2.2-1: Performance achieved in each scenario for the renovation of residential buildings

SCENARIO A1: Renovate 1 % of the remaining non-ESM GFA						SCENARIO A2: Renovate 1 % of all non-ESM GFA as of 01.01.2016					
	Residential buildings						Residential buildings				
Year	GFA, m^2	Investments, BGN	Savings (FEC and emissions)			Year	GFA, m^2	Investments, BGN	Savings (FEC and emissions)		
			ktoe	GWh	t CO_2				ktoe	GWh	t CO_2
2016	2 328 652	349 297 845	25.81	300.15	34 929.78	2016	2 328 652	349 297 845	25.81	300.15	34 929.78
2017	2 305 366	345 804 867	25.55	297.15	34 580.49	2017	2 328 652	349 297 845	25.81	300.15	34 929.78
2013	1 141 156	171 173 409	12.65	147.09	1 117.34	2018	2 328 652	349 297 845	25.81	300.15	34 929.78
2019	1 135 450	170 317 542	12.59	146.35	17 031.75	2019	2 328 652	349 297 845	25.81	300.15	34 929.78
2020	1 129 773	169 465 954	12.52	145.62	16 946.60	2020	2 328 652	349 297 845	25.81	300.15	34 929.78
Total	**8 040 397**	**1 206 059 617**	**230.32**	**2 678.20**	**311 673.63**	**Total**	**11 643 262**	**1 746 489 225**	**283.94**	**3301.65**	**384 227.63**
SCENARIO B1: Renovate 1.5 % of the remaining non-ESM GFA						**SCENARIO B2: Renovate 1.5 % of all non-ESM GFA as of 01.01.2016**					
	Residential buildings						Residential buildings				
Year	GFA, m^2	Investments, BGN	Savings (FEC and emissions)			Year	GFA, m^2	Investments, BGN	Savings (FEC and emissions)		
			ktoe	GWh	t CO_2				ktoe	GWh	t CO_2
2016	3 492 978	523 946 767	38.72	450.23	52 394.68	2016	3 492 978	523 946 768	38.72	450.23	52 394.68
2017	3 440 584	516 087 566	38.14	443.47	51 608.76	2017	3 492 978	523 946 768	38.72	450.23	52 394.68
2018	3 388 975	508 346 252	37.57	436.82	50 834.63	2018	3 492 978	523 946 768	38.72	450.23	52 394.68
2019	3 338 140	500 721 059	37.00	430.27	50 072.11	2019	3 492 978	523 946 768	38.72	450.23	52 394.68
2020	3 288 068	493 210 243	36.45	423.81	49 321.02	2020	3 492 978	523 946 768	38.72	450.23	52 394.68
Total	**16 948 746**	**2 542 311 888**	**417.87**	**4 859.04**	**565 467.36**	**Total**	**17 464 892**	**2 619 733 838**	**425.91**	**4 952.48**	**576 341.44**
SCENARIO C1: Renovate 2.5 % of the remaining non-ESM GFA						**SCENARIO C2: Renovate 2.5 % of all non-ESM GFA as of 01.01.2016**					
	Residential buildings						Residential buildings				
Year	GFA, m^2	Investments, BGN	Savings (FEC and emissions)			Year	GFA, m^2	Investments, BGN	Savings (FEC and emissions)		
			ktoe	GWh	t CO_2				ktoe	GWh	t CO_2
2016	5 821 631	873 244 613	64.53	750.38	87 324.46	2016	5 821 631	873 244 613	64.53	750.38	87 324.46
2017	5 676 090	851 413 497	62.92	731.62	85 141.35	2017	5 821 631	873 244 613	64.53	750.38	87 324.46
2013	5 534 188	830 128 160	61.35	713.33	83 012.82	2018	5 821 631	873 244 613	64.53	750.38	87 324.46
2019	5 395 833	809 374 956	59.81	695.49	80 937.50	2019	5 821 631	873 244 613	64.53	750.38	87 324.46
2020	5 260 937	789 140 582	58.32	678.11	78 914.06	2020	5 821 631	873 244 613	64.53	750.38	87 324.46
Total	**27 688 679**	**4 153 301 807**	**687.70**	**7996.61**	**930 599.08**	**Total**	**29 108 154**	**4 366 223 063**	**709.85**	**8254.14**	**960 569.07**

3. POLICIES AND MEASURES TO PROMOTE ECONOMICALLY EFFICIENT MAJOR IMPROVEMENT OF ENERGY PERFORMANCE OF BUILDINGS

3.1 Measures in the context of the State's energy efficiency policy

Title of the measure in the context of the State's energy efficiency policy	*Type of the measure*	*Status of the measure*	*Implement by*	*Responsible institution and related partner institutions*	*Expected result*	*Potential financing sources*
1. Energy efficiency programmes at municipal level, consistent with the objectives set in the acts issued pursuant to Article 4 and in points 1–4 of Article 5(3) ZEE, to be developed by municipal administrative and approved by municipal councils These programmes should be developed and updated in line with objectives laid down in the documents referred to Article 4 and in points 1–4 of Article 5(3) ZEE. In addition to energy saving measures for the buildings, the programmes should include on-the-job activities, strengthening the administrative capacity for the implementation of energy efficiency projects and energy management as part of the occupancy of the building. Each programme should ensure that results are monitored and should provide for appropriate measures where the programme fails to make satisfactory progress. Designated managers at senior level will steer the implementation of the measure.	Administrative	On-going	2020	Provincial and municipal administrations	Energy efficiency programmes at municipal level developed and adopted by municipal councils	Within the confines of the approved budget. Public-private partnerships (PPPs) with obligated parties as per Article 14(4) ZEE or with ESCO

Title of the measure in the context of the State's energy efficiency policy	*Type of the measure*	*Status of the measure*	*Implement by*	*Responsible institution and related partner institutions*	*Expected result*	*Potential financing sources*
2. Develop a scenario for renovation and improvement of the energy performance of buildings.	Administrative	Planned	2017	ME, MRRB, AUER	The documents referred to in points 1, 3 and 4 of Article 5(3) ZEE approved by the Council of Ministers	This measure does not require funding
3. Update the integrated urban development plans and the municipal development plans by including investment projects consistent with the objectives and scenarios for implementation of the acts referred to in points 1–4 of Article 5(3) ZEE.	Regulatory	Planned	2017–2018	Municipalities Municipal mayors Presidents of municipal councils	Completed building renovation projects in accordance with the programmes referred to in Article 5(3), including NZEB projects	OPRG 2014–2020 NTEF FEEVI Other energy efficiency programmes

Title of the measure in the context of the State's energy efficiency policy	*Type of the measure*	*Status of the measure*	*Implement by*	*Responsible institution and related partner institutions*	*Expected result*	*Potential financing sources*
4. Training, education and control activities aimed at strengthening the administrative capacity for implementation of measures related to energy efficiency and renewable sources.	Education	Planned	2016–2020	The ME as a programme operator for Procedure BG 04 04-05 'Training to strengthen the administrative capacity in respect of measures related to energy efficiency and renewable sources'.	Experts from central and municipal administrations trained	Programme BG04 'Energy efficiency and renewable energy' funded by the Financing mechanism of the EEA Municipal budgets
5. Energy centres/expert panels at municipal level to expand the scope of their work by adding activities related to monitoring the impact of energy efficiency projects completed in the territory of their municipalities.	Administrative	Planned	2017–2020	Municipalities in partnership with universities, energy agencies and firms specialised in the audit and certification of buildings	Municipal administrations improve their administrative capacity to implement and monitor EE projects	EU technical assistance programmes Within the confines of approved municipal budgets

Title of the measure in the context of the State's energy efficiency policy	*Type of the measure*	*Status of the measure*	*Implement by*	*Responsible institution and related partner institutions*	*Expected result*	*Potential financing sources*
6. Develop a national cost-benefits analysis for the territory of Bulgaria based on climatic conditions, economic viability and technical compatibility in accordance with Annex IX Part 1 of Directive 2012/27/EU in order to identify the most resource- and cost-efficient solutions to meet the demand for heating/cooling energy in the specific circumstances of Bulgaria. The analysis examines the national potential for high-efficiency cogeneration.	Regulatory	Completed	2016	The ME in collaboration with the NSI and AUER	Compliance with Article 14 of Directive 2012/27	The budget of the ME
7. Create a national database (list) of obligated parties as per Article 14(4) ZEE. The list is made available to the AUER for the Agency to exercise control on compliance by these parties with their obligations and on the estimations of energy savings achieved.	Administrative	Planned	2017	The KEVR and AUER	List of obligated parties as per Article 14(4) ZEE, including their administrative details. Data exchange agreement concluded between the KEVR and the AUER	Within the confines of the approved budgets of the KEVR/AUER

Title of the measure in the context of the State's energy efficiency policy	*Type of the measure*	*Status of the measure*	*Implement by*	*Responsible institution and related partner institutions*	*Expected result*	*Potential financing sources*
8. Introduce an innovative approach to develop, maintain and update an efficient central database of the energy performance of buildings in Bulgaria to inform the development of national plans and programmes and the reporting on such plans and programmes.	Administrative	Planned	2017–2018	The AUER in collaboration with the MMRB and universities	An efficient electronic database	EU programmes Within the confines of the approved AUER budget

Title of the measure in the context of the State's energy efficiency policy	*Type of the measure*	*Status of the measure*	*Implement by*	*Responsible institution and related partner institutions*	*Expected result*	*Potential financing sources*
9. Full and standardised updating of the database of the energy performance of State-owned, municipal and residential buildings in Bulgaria.	Administrative	Planned	2017–2018	AUER, MRRB	Updated energy performance database of the buildings stock	Within the confines of the approved budgets of the AUER/MRRB
10. Implement the National programme for the energy efficiency of multifamily residential buildings in Bulgaria.	Investment	On-going	2016–2019	MRRB	Energy savings in residential buildings, GFA renovated in accordance with the objectives of the Programme	The Bulgarian Development Bank through the EIB
11. Develop a concept for funding the next phase of the National programme for the energy efficiency of multifamily residential buildings in Bulgaria with a focus of market-based financing mechanisms	Regulatory and investment	On-going	2017–2018	MRRB	Updated National programme for the energy efficiency of multifamily residential buildings in Bulgaria	Within the confines of the approved budget of the MRRB

Title of the measure in the context of the State's energy efficiency policy	*Type of the measure*	*Status of the measure*	*Implement by*	*Responsible institution and related partner institutions*	*Expected result*	*Potential financing sources*
12. Continuing training for consumers, builders, architects, engineers, EE consultants and installers of buildings components and systems aimed at disseminating knowledge of available energy efficiency mechanisms and of the financial/legal framework in Bulgaria. The measure is being implemented in accordance with Articles 16 and 17 of Directive 2012/27/EU and is linked to the requirements set out in Directive 2010/31/EU.	Education	On-going	2016–2020	Universities, the AUER, professional associations	Improved professional qualification and skills for conducting energy audits of buildings and for design/application of energy saving measures in buildings	Public-private partnerships EU programmes including programmes for cooperation with other Member States
13. Include residential buildings in the mandatory EE certification scheme and adopt other legislative changes to ensure more appropriate and efficient application of the Union's EE law in Bulgaria	Legislative	Completed	2016	The ME in collaboration with the MRRB, AUER and other institutions	The ZEE amended as appropriate	This measure does not require funding

Title of the measure in the context of the State's energy efficiency policy	*Type of the measure*	*Status of the measure*	*Implement by*	*Responsible institution and related partner institutions*	*Expected result*	*Potential financing sources*
14. Implement energy management at central, provincial and local government level.	Administrative and regulatory	Planned	2020	Ministries, agencies, provincial administrations and municipal administrations in collaboration with subject-matter experts	Energy management system implemented in buildings owned by the State and municipalities	Public-private partnerships with obligated parties as per Article 14(4) ZEE or ESCO. Within the confines of the approved budgets of the ministries. Within the confines of the approved budgets of the municipalities. EU programmes and relevant instruments
15. Develop and implement a National programme for creating a sustainable model of end-user behaviour aimed at efficient energy use in buildings. The Programme is planned in accordance with Article 12 of Directive 2012/27/EU.	Institutional and horizontal	Planned	2018–2020	Universities and private organisations in collaboration with relevant institutions	Successful launch of a programme to inform and empower final energy users	EU programmes and relevant instruments Public-private partnerships

Title of the measure in the context of the State's energy efficiency policy	*Type of the measure*	*Status of the measure*	*Implement by*	*Responsible institution and related partner institutions*	*Expected result*	*Potential financing sources*
16. Implement a white certificates trading scheme	Legislative	Planned	2020	ME, AUER, MF	A new financial incentive introduced in the market for energy services	Private investments
17. Change course of tax policy by linking property (building) taxes to the energy performance achieved: buildings of inferior energy consumption classes should attract higher tax rates, while buildings of superior energy consumption classes should benefit from lower tax rates. The measure requires an amendment of the Local Taxes and Fees Act (ZMDT), including removal of the tax benefits afforded in points 18 and 19 of Article 24 ZMMD and introduction of a tax the rate of which is linked to the scale of energy consumption classes.	Legislative	Planned	2018	The MF in collaboration with the ME, MRRB and AUER	Regulations updated in line with the new market realities	This measure does not require funding

3.2 Analysis and assessment of existing barriers to the improvement of energy efficiency

Improvement of energy efficiency requires a systemic and holistic approach, and concerted implementation efforts. This in turn requires analysis, assessment and regular review of barriers. The challenge is to design a policy framework which works to dismantle the barriers while ensuring sufficient information, incentives and capacity to support owners and investors undertake initiatives and appropriate steps.

Macroeconomic barriers to the funding of projects

Institutional barriers: The rules and practices existing in various countries, including Bulgaria, do not always contribute sufficiently to the improvement of energy efficiency. Concerted effort is need to address this issue.

External factors: The benefits brought about by energy efficiency to society in general and to the environment, energy security, social policy and employment in particular are very complicated and therefore not easily measurable. This detracts from their potential to encourage investments in energy efficiency.

Barriers related to the specificities of the housing sector

While energy savings potential is the highest in residential buildings, which is why they are the main target group of the National programme for the energy efficiency of multifamily residential buildings, a range of factors prevent to a large extent the application of energy efficiency policies and measures in these buildings:

Barriers related to information and motivation: Consumers fail to realise that energy efficiency is a major issue since energy expenditure tends to be lower than the price of many other factors. The majority of users do not believe that the expected energy savings are worth the time and effort to obtain sufficient information for deciding whether to request financial support for the application of energy saving measures. Many surveys have confirmed that households persistently underestimate the benefits of these measures, and overestimate the time, costs and effort applied. Consumers should therefore be provided with all relevant information and with assurance that the proposed measures and the related mechanisms for monitoring and control will lead to the achievement of the expected impacts and benefits identified in audits and investment projects. Furthermore, there should be sufficient choice of certified contractors capable to practically apply the measures at least to a minimum quality standard.

Legal, regulatory and organisational barriers: Practical experience indicates that most issues stem from the diverse social, financial, age and psychological profiles of apartment owners, which disrupts the management of condominium building. Improving the legal environment in which condominium buildings operate is an important precondition for the roll out of a broad residential renovation process.

Barriers related to the specificities of projects

Energy efficiency projects reduce energy costs over time; however, it is always difficult to discern long-term benefits versus short-term advantages.

Size of the projects/investments: The average size of an EE project is often modest compared to the mainstream loans offered by commercial banks, which makes energy efficiency projects less attractive to banking institutions. Moreover, EE projects typically involve more *soft* expenditure than traditional loans. Practical experience indicates that market mechanisms alone fail to consolidate projects so as to create large-scale profitable opportunities.

Uncertainty about energy savings: Generally, an adequately selected package of measures can lead to a predictable level of savings; however, concrete saving levels in individual dwellings can never be guaranteed. Systemic ex-post assessments are considered expensive exercises and their practical use is still limited. Accordingly, the perceived uncertainty about the energy savings that may be achieved often scares developers and owners away from market-based investments in energy efficiency.

Risk assessment and management: EE projects are integrated solutions wherein energy savings are not yet sufficiently guaranteed to make the assets usable as collateral to bank loans. Furthermore, efficient monitoring of energy use and thereby of the impacts of the measures is in many cases impossible due to the presence of many owners in residential buildings. This limits the potential of purely market models for the financing of EE projects, e.g. by involving energy services providers (ESCO model).

Barriers to market-based funding of projects

Price and accessibility of financial resources: Energy savings measures are not cheap exercises, in particular when they come in a package prescribed by a professional energy efficiency audit. Practical experience indicates that users tend to choose the most inefficient options, as far as the choice is left to them, simply because of the lower initial costs. Moreover, access to borrowing for renovation projects is not yet sufficiently feasible.

Risk exposure: In assessing the validity of an investment project, financiers attribute paramount importance to the risk/yield ratio, and even higher importance to the creditworthiness of their potential borrower. Energy efficiency projects often fail to meet the generally accepted criteria used for assessing the financial risk of individual projects. Commercial banks choose to finance safe, medium-yield investment projects, and consider that investments in residential energy savings measures are risky and insecure.

Furthermore, extending loans to associations of condominium owners is a practice unseen in Bulgaria. In the eyes of local banks, legitimate borrowers are natural persons or legal entities capable of providing collateral the banks are used to. Although many European countries have been applying innovative (for Bulgaria) approaches for years, these approaches are not yet recognised by the local banking community.

Time to breakeven point: Energy efficiency projects in residential buildings typically take more time to breakeven (repayment) than many mainstream investments. Commercial banks consider this to be a significant downside of EE projects. Using the repayment period as the main measure of the efficiency of such investments is inappropriate because it leaves off-board other important factors such as overall improvement of wellbeing in general and of living/sanitary conditions in particular, or job creation. Accordingly, the focus on time to breakeven to the exclusion of other factors is a major barrier to market-based funding of energy efficiency projects.

Information, awareness and communication: Commercial banks have only modest practice in financing comprehensive energy efficiency projects in residential buildings due to the perception that these projects are more complicated than traditional lending and their implementation requires additional levels of expertise, effort and expenses. Nevertheless, commercial banks are indispensable if sustainable financing mechanisms are to be created.

Lack of adequately skilled and experienced personnel: The majority of actors in the EE financing and implementation process lack adequate background and knowledge in the area. Suppliers, manufacturers and bankers do not have appropriate skills to promote energy efficiency products to their clients. A purposeful, long-term and comprehensive programme is required in order to build a critical mass of EE experts.

4. CREATING A FINANCIAL FRAMEWORK TO GUIDE INVESTMENT DECISIONS OF INVESTORS, BUILDERS AND FINANCIAL INTERMEDIARIES

4.1 White certificates trading scheme

The Bulgarian white certificates trading scheme (WCTS) was developed within project BG161P0003-4.3.03-0001-C0001, Strengthening the institutional capacity of the Sustainable Energy Development Agency (AUER) with a view to providing more and better services in the field of energy efficiency. The project was implemented with financial assistance from the Operational Programme Development of the Competitiveness of the Bulgarian Economy 2007–2013, co-funded by the European Union through the European Regional Development Fund.

The project falls in the scope of Priority axis 4 of the Operational Programme, Strengthening the international market positions of Bulgaria's economy, namely by improving the national quality infrastructure and provision of more and better business services.

Participants in the scheme are:

Obligated parties

'Obligated parties' in the meaning of Article 14(4) ZEE are:

- ✓ end suppliers, providers of last resort, traders holding a licence for the activity of 'trading in electricity' having annual sales of electricity to end-users in excess of 20 GWh;
- ✓ heat transmission undertakings and heat energy suppliers having annual sales of heat energy to end-users in excess of 20 GWh;
- ✓ end suppliers and traders in natural gas having annual sales to end-users in excess of 1 million cubic metres;
- ✓ traders in liquid fuels having annual sales to end-users in excess of 6.5 kilotonnes of liquid fuels, with the exception of fuels for transport purposes;
- ✓ traders in solid fuels having annual sales to end-users in excess of 13 kilotonnes of solid fuels.

Obligated parties are expected to be the main participants as the WCT scheme allows them to purchase white certificates to make up eventual slippage behind their individual target (obligations under the ZEE) by genuine energy saving measures at the level of final users. The certificates are tradable and can thus be purchased from other obligated parties or non-obligated holders. Essentially this is market-based trading in energy savings. The WCTS is expected to add momentum to the energy service sector, encourage the implementation of more and better energy saving measures, and strengthen the competitiveness of WCTS participants in the long-term, thereby improving the state of the economy in general and of the energy sector in particular.

Non-obligated parties

Non-obligated parties are all other stakeholders, including owners of properties in which energy saving measures are applied and contractors which apply the measures. The mechanism aims to encourage those who decide to invest in improving the quality of their life by initiating, willingly or urged by circumstances, various energy savings measures to improve workplace standards, private living spaces or production systems.

Obligated parties will also be able to purchase white certificates from non-obligated parties where they fall short of their individual targets. Non-obligated parties will obtain additional financial reward for the measures applied as the mechanism will enable them sell their white certificates, either by direct bilateral contracts with obligated parties or at a stock exchange (via a licensed broker). This will encourage more investments, thereby improving Bulgaria’s energy efficiency sector.

Energy end users

End users who choose to be proactive will also benefit from the scheme in the capacity of final beneficiaries of the savings achieved. The reduced consumption of energy will reduce costs and thereby improve living standards. Another potential benefit for end users will be the option to acquire white certificates for their energy savings, and obtain financial gains by trading their certificates.

Other stakeholders

The successful implementation of the WCTS is expected to improve the sustainability of energy production and use by creating additional financial opportunities for financial institutions (because of the nature of the scheme, namely trading in securities) and providers of highly efficient technologies (encourage energy savings measures), thereby increasing the demand for skilled workforce.

4.2 Financial incentives for investors in NZE buildings

Several financial schemes are available to guide investment decisions of developers, builders and financial intermediaries as regards the construction of new buildings or the renovation of existing buildings to the NZEB standard as per the scale of energy consumption classes:

- Grand financing (10–20 %) for proven energy saving technology which converts a building to a NZE building (Class A + minimum 55 % energy from renewable sources). The measure is appropriate for the renovation of existing buildings which have been in use for 30 years or more by applying energy saving measures that lead to an energy efficiency level exceeding the minimum requirements. The measure is not appropriate for new buildings because they must all be zero-energy buildings after 2018.
- *Preferential loans for high-efficiency buildings (individual houses or apartments)* is a mechanism applicable both to new and existing buildings. Investors can use the mechanism either directly or through banking institutions. It is successful where the loan interest is linked to the energy efficiency of the building, i.e. better energy performance of the building means better terms of the loan.
- Credit lines targeting environmental, EE and RES projects. This mechanism is successfully applied in Bulgaria.
- Extending the financial portfolio of the Energy Efficiency and Renewable Sources Fund (FEEVI) by adding new packages to support projects aimed at improving energy efficiency in buildings.
- Set up energy efficiency funds at municipal level.

4.3 Develop and apply a socially-driven business model of entrepreneurship aimed at the construction and offering of social housing for the needy, branded as Social Enterprise Products

The mechanism is successful where it creates a clear market profile and legal recognition of social construction enterprises as fully fledged market actors which provide services of general economic interest. Equal treatment of these enterprises is not common in Bulgaria and uptake of the model by building companies is limited or none.

The mechanism is closely linked to the National Social Economy Concept of the Ministry of Labour and Social Policy (MTSP). The concept 'expresses the State's social commitment to the establishment and strengthening of a favourable environment for the realisation and development of models and practices in the area of social economy in the Republic of Bulgaria'.

The mechanism supports startup enterprises and/or organisations in the construction sector established especially for the social purpose to build social housing. These companies streamline their activities so as to achieve diverse impacts. As the National Social Economy Concept indicates, social economy is part of the real economy and of civil society where individuals and/or legal entities, volunteer associations and other organised entities conduct business to the benefit of society and reinvest the profit in the achievement of social goals. It is known that social enterprises are managed as businesses, produce goods and services for the market economy and allocate part of their resources to the achievement of social and environmental objectives. From a business location perspective, social enterprises are positioned between the traditional private sector and the traditional public sector. This positioning creates new opportunities in the building industry in combination with the benefits of energy efficiency in buildings. Creating this profile of construction companies will help support small and medium-sized enterprises, because the majority of social businesses are exactly SMEs regardless of their legal status. EU law provides a solid basis which supports social economy in general.

The mechanism requires both amendments to legislation and change of the practices of government bodies, and is a model for the integration of social policies (housing and energy policies) with a focus on the social impact of the activities related to the construction and provision of social housing.

4.4 Operational Programme 'Regions in Growth' 2014–2016

4.1.1. Grant procedure BG16RFOP001-1.001-039 'Implementation of integrated plans for urban regeneration and development'

The grant procedure aims to support implementation of integrated plans for urban regeneration and development for sustainable and long-lasting resolution of the high concentration of economic, environmental and social problems in 39 cities of hierarchical level 1, 2 and 3 in accordance with the National concept for spatial development of Bulgaria 2013–2025 (NKPRE).

Table 4.4.1-1: The budget of Grant procedure 'Implementation of integrated plans for urban regeneration and development', BGN

Investment priority	***Gross amount of grants available (100 %)***	***ERDF contribution (85 %)***	***National co-financing (15 %)***
1. Energy efficiency in administrative and residential buildings	410 014 803.11	348 512 582.64	61 502 220.47
2. Integrated urban transport	237 785 209.33	202 117 428.03	35 667 781.30
3. Urban environment	403 804 307.47	343 233 660.56	60 570 646.91
4. Social infrastructure	155 307 253.88	132 011 165.22	23 296 088.66
5. Educational infrastructure	165 647 819.01	140 800 647.63	24 847 171.38

7.1.2. Grant procedure BG16RFOP001-2.001 'Energy Efficiency in peripheral areas'

Priority Axis 2 'Support for energy efficiency in support centres in peripheral areas' is designed to support the implementation of energy efficiency measures in public and residential buildings in small municipal centres providing services to the surrounding peripheral areas. It corresponds to Thematic Objective 4 'Support for transition to a low-carbon economy in all sectors'. Interventions within the framework of this priority axis will contribute to the achievement of the national energy saving targets by 2020 in accordance with the NPDEE 2014–2020. The activities planned will lead to improved energy efficiency of buildings in the target territories, contributing directly to reducing final energy consumption and indirectly to reducing greenhouse gases in small towns operating as support centres of the polycentric system in accordance with the NKPRE 2013–2025.

The support provided by this priority axis aims to address adequately the problems of increased migration towards large and medium cities, ensure better quality of life and better services, modernise the public infrastructure in the peripheral areas of the country and promote urban-rural interactions.

The priority axis has two specific objectives: 'Improvement of the energy efficiency of the residential sector in support centres at level 4 of the national polycentric system', and 'Improvement of the energy efficiency of public buildings in support centres at level 4 of the national polycentric system'.

The specific beneficiaries of this grant procedure are 28 municipal administrations of small towns which are support centres at level 4 of the national polycentric system in accordance with NKPRE 2013–2025.

4.5 Residential energy efficiency credit line (REECL)

On 1 September 2016 the European Bank for Reconstruction and Development launched the third programming period of the REECL, which made its debut in the Bulgarian market back in 2005. The aim is to carry forward the positive impact achieved by the Programme until now and respond to the need for further improvement of energy efficiency in Bulgaria's residential sector.

The REECL is a EUR 20 million credit facility for the funding of energy efficiency in the residential sector. The funding available is disbursed through Bulgarian commercial banks with a proven track record in loans for energy savings measures in Bulgarian homes. These measures include: energy-efficient windows; wall, roof and floor insulation; high-efficiency burners and biomass-fuelled boilers and systems; water heater solar collectors; energy-efficient gas-fuelled boilers and systems; air-conditioning systems powered by heat pumps; integration of photovoltaic systems in buildings; district heating substations and systems/installations in buildings; recuperative ventilation systems, and high-efficiency lifts.

ESM implementation in dwellings is further encouraged by 10 % in additional grants for eligible projects in houses comprising one or two self-contained residential units and 20 % for projects in multifamily houses containing three or more self-contained residential units. Disbursements are made after all installation work is completed and verified by an independent consultant. The EUR 4.4 million grant component is provided by the KIDSF.

4.6 Energy Efficiency and Renewable Sources Fund (FEEVI)

The Energy Efficiency and Renewable Sources Fund (FEEVI) was established on the basis of the Energy Efficiency Act (of 2004) as a legal entity independent from state institutions. The fund operates in accordance with the provisions of the ZEE, the ZEVI and the agreements concluded with its donors, and is not included in the consolidated national budget. The initial capital of the FEEVI was raised entirely from grant contributions. The main donors are the UN Global Environment Fund through the International Bank for Reconstruction and Development (the World Bank) which contributed USD 10 million, the Government of Austria with EUR 1.5 million, the Government of Bulgaria with BGN 3 million and private Bulgarian sponsors.

The FEEVI operates as a financing institution by providing loans or loan guarantees and as a consultation centre. It assists Bulgarian companies, municipalities and private individuals in developing energy efficiency investment projects. The fund provides financing, co-financing or guarantees to other financial institutions.

The main principle in the management of the FEEVI is public-private partnership. The fund operates in accordance with arrangements and rules developed with the technical assistance of the World Bank and approved by the Bulgarian government. Users of the fund are central and local authorities, enterprises, institutions (including educational institutions and health facilities), non-government organisations and individuals.

A specific feature is that the fund develops and manages a wide range of financial products designed to support its clients: investment grants, loans, bridge financing, loan guarantees, capital investment and so on. Favourable terms for the various financing instruments are achieved by cooperation with and involvement of other financial institutions (banks).

In accordance with the policy of the FEEVI, the main instrument by which the fund supports projects is debt financing, allowing the fund as to be 'renewable' and guaranteeing its financial stability.

4.7 National Trust Eco-Fund (NTEF)

The National Trust EcoFund was established in October 1995 by the Debt-for-Environment Swap Agreement between the Government of the Swiss Confederation and the Government of the Republic of Bulgaria.

Pursuant to Article 66(1) of the Environment Protection Act, the objective of the fund is to manage the proceeds from debt-for-environment and debt-for-nature swaps, from international trade in GHG assigned amount units (AAUs) and the National Green Investments Scheme, from the sale of GHG emission allowances for aviation activities, as well as proceeds from other types of agreements with international, foreign or Bulgarian sources for financing environmental protection activities in the country. The Fund contributes to the implementation of the Bulgaria government's policy and to the fulfilment of Bulgaria' international commitments in the area of environmental protection.

In 2011–2014, the National Green Investments Scheme used proceeds from the sale of Austrian AAUs for the implementation of energy efficiency projects in 77 public buildings in Bulgaria (owned by municipalities or by the State) to a total value of BGN 27 445 418. The National Green Investments Scheme and the two AAUs contracts between Bulgaria and Austria are implemented in accordance with Article 17 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change. The proceeds from AAU sales are managed by the NTEF and are invested primarily in projects aimed at the improvement of energy efficiency in public buildings.

The National Trust EcoFund is an independent institution that has the support of the Bulgarian government. The Fund operates the following programmes:

- Climate Investment Programme (CIT)

  In 2015 the CIT financed EE projects in 49 public buildings in the territory of Bulgaria to a total value of BGN 23 909 439. Plans are being made for the funding of additional 84 public projects to a total value of BGN 38 million.

- National Green investments Scheme

  In 2015, proceeds from the sale of Austrian AAUs were allocated to EE projects in 12 public buildings in Bulgaria to a total value of BGN 5 117 582.

- Debt-for-Environment

- Pilot programme for rehabilitation of the environment

- Fund for protected territories.

The concept of the national NZEB definition is fully coherent with the ideas and objectives of the programmes operated by the NDEF.

4.8 Energy savings performance contracts

This financing mechanism is regulated in Article 72 of the ZEE.

ESCO contracts support the implementation of energy efficiency measures in buildings, enterprises, and industrial and outdoor lighting systems where the means for repayment of the investment and of the remuneration due to the contractor come from the energy savings achieved.

The client party to an ESCO contract can be the final user and the contractor can be a provider of energy efficiency services. An ESCO contract is concluded after an energy efficiency audit is carried and an energy performance certificate establishing the actual energy use status of the building is issued.

ESCO contracts are concluded in writing and contain at least the following elements:

- ✓ normalised energy consumption as established by the energy efficiency audit;
- ✓ a list of energy efficiency measures to be implemented, including the steps to be undertaken for implementing the measures and where appropriate the related costs;
- ✓ guaranteed energy savings, procedure and time limits for determining the savings after the implementation of the measures envisaged in the contract, as well as arrangements for measuring and verifying energy savings, guaranteed economies, quality assurance and guarantees;
- ✓ obligation to fully implement the measures in the contract and keep record of all changes made during the project;
- ✓ description of the financial implications of the project and distribution of the financial savings achieved between the two parties;
- ✓ financing method;
- ✓ method for payment of the remuneration;
- ✓ other clauses such as provisions related to amendment of the framework conditions, content or performance of the contract, inclusion of equivalent requirements to any subcontracting arrangements with third parties, detailed description of the obligations of each contracting party and penalties for non-performance of these obligations.

A specific feature of these contracts is that the ESCO contractor arranges for the provision of all or part of the service with its own financial resources and/or commits to securing financing from a third party. The contractor bears all financial, technical and commercial risks associated with the implementation of the energy efficiency measures and activities provided in the contract and with achievement of guaranteed result.

If a contract under Article 72(1) is concluded for state and/or municipal buildings, the state and/or the municipalities should allocate an amount in their budgets corresponding to the normalised energy consumption of these buildings during the term of the contract. The Ministry of Energy has issued instructions on the application of this financing mechanism. The providers of energy saving performance services (known as ESCO contractors) use their own resources for the provision of ESCO services and for investments (surveying, implementation, operation and maintenance), and guarantee sufficient energy savings so that the investment can be repaid and a certain profit obtained. The agreement for the provision of energy efficiency services takes the form of a contract between the service provider and the client. Implementation of the measures leads to reduction of energy-related, operational and building maintenance costs. Under ESCO services contracts, the investment costs are repaid from the savings achieved. These projects are characterised by quick implementation and are in the mutual interest of both parties.

4.9 National programme for the energy efficiency of multifamily residential buildings

The National programme is intended to achieve both short-term targets and long-term goals at European level by addressing challenges such as climate change, energy security and depletion of resources.

The National programme is applied in all Bulgarian municipalities in pursuance of the following objectives:

- reduce energy use in households;
- reduce household expenditure;
- increase the values of the properties;
- renovate the entrances of the buildings;
- achieve new and modern external appearance of residential buildings;
- create warmer, cosier and better-looking homes.

Implementation of the National programme will bring about both economic benefits by giving momentum to various businesses (designers, builders, technical and energy efficiency auditors, producers of materials) and social benefits such as:

- ✓ additional jobs;
- ✓ establishment of traditions in the management of multifamily residential buildings;
- ✓ more disposable income for households;
- ✓ raising public awareness of energy efficiency improvement methods;
- ✓ better quality of life for those living in buildings made of prefabricated panels.

In early 2017 the budget of the Programme was increased to BGN 2 billion. Support is in the form of grants covering 100 % of the project costs in buildings which have filed applications for the financing of renovation activities and have had their applications approved.

The technical and financial administration of the Programme is responsibility of municipalities.

In 2015, eligible for the Programme were all multifamily residential buildings constructed using industrial methods: large pre-cast panel residential construction; lift-slab construction; large-size in-situ cast concrete structures; creeping formwork construction and their variations. Eligible buildings must comprise at least 36 individual housing units.

Additional types of buildings were admitted to the Programme as from 1 January 2016:

- multifamily residential buildings constructed using industrial methods: large pre-cast panel residential construction; lift-slab construction; large-size in-situ cast concrete structures; creeping formwork construction and their variations, of three or more floors and comprising not less than 6 and not more than 36 individual housing units;
- multifamily residential buildings (monolith buildings) designed before 26 April 1999, of three or more floors and comprising six or more individual residential units.

The buildings mentioned above are eligible for funding only if they are not covered by projects proposed by municipalities under Priority Axis 1 or 2 of OPRG 2014–2020.

Works eligible for funding include:

- ✓ rehabilitation, strengthening and overhaul of the structure of multifamily residential buildings, depending on the extent of damage incurred in the course of their service life. These works must be identified as indispensable in the technical audit reports in order to be eligible;
- ✓ renovation of the common structures of multifamily residential buildings (repair of roofs/facades, repainting of staircases, etc.);
- ✓ application of energy efficiency measures identified as indispensable in the energy audit reports:

  Envelope:

  - replacement of joinery (windows, doors, vitrines, etc.);
  - thermal insulation of envelope components (external walls, roofs, floors, etc.).

  Microclimate system:

  - overhaul, modernisation or replacement of local heat sources/boiler units belonging to the condominium building, including fuel conversion where this is shown to have energy-saving and environmental impacts;
  - installation of systems that use energy from renewable sources to cover part of the energy demand of the building;
  - rehabilitation or replacement of components of the heating, ventilation and air conditioning systems in the common areas of the building with a view to improving their energy efficiency;
  - reconstruction of vertical heat distribution systems into horizontal systems to enable individual

metering of the heat used by each housing unit in the condominium building;

- rehabilitation or replacement of electrical systems and installation of energy saving lighting fixtures in the common areas of the building;
- installation of centralised systems for automatic control of the heat supplied from local heat sources owned by the condominium building;
- gasification of buildings (installation of gas-fired boiler or connection to an urban gas distribution network where available);
- measures to improve the energy efficiency of lifts;

✓ additional construction and installation works related to the application of ESM and restoration of common structures within individual housing units, if damaged in the course of the renovation works. Additional works are limited to the restoration in original condition of structures damaged in the course of the renovation of common areas or during the replacement of joinery in housing units.

Eligible for funding under the Programme is the most cost-effective package of energy saving measures required to achieve energy consumption Class C as per Regulation No 7 of 2004 on the energy efficiency of buildings.

4.10 Other energy efficiency financing schemes

The scale of investment at EU level required to achieve 20 % increase of energy efficiency by 2020 is estimated at around EUR 100 billion per year. To achieve this goal, the EU is allocating more public funds to energy efficiency. In parallel, appropriate financing mechanisms are being used to leverage private investments so that the required financial resources can be secured. Initiatives which support energy efficiency investments at EU level are outlined in the next paragraphs:

European Fund for Strategic Investments (ESFI)

The ESFI is a new tool for the mobilisation of strategic private investments where the market alone fails to do so. The Fund supports infrastructure and innovation projects, and provides venture capital for SMEs. The objective is to maximise the impact of public spending by leveraging additional financial resources and unlocking private investments. The ESFI finances key development areas such as (1) infrastructure (transport, energy, digital, environmental, urban and social); (2) education and training, healthcare, R&D, ICT, innovation; (3) renewable energy and energy efficiency; (4) support for SMEs and intermediate companies.

The ESFI resides with the EIB, a strategic partner of the European Commission. Bulgaria has already implemented initiatives with ESFI support.

International financial institutions (IFI)

International financial institutions, including the ones most active in Bulgaria, namely the EBRD, the EIB and the World Bank, are instrumental to the development of sustainable financial mechanisms aimed at improving energy efficiency. In particular, international financial institutions:

- ✓ support actively local banks and institutions in designing energy efficiency financing schemes;
- ✓ provide long-term financing with inbuilt technical assistance for their clients.

4.11 Policies and measures to support the implementation of the National long-term programme

Resources and materials of various organisations and institutions were researched in order to lay down an indicative list of policy options and measures in six categories. The potential application of these options in Bulgaria has been assessed.

Table 4.11-1: Strategic polices/measures and their potential application in Bulgaria

Policy	*Potential application*
Ensure support for overall renovation of the building stock across the entire spectrum of policies.	The support will help create an environment which provides certainty and market confidence over a longer period of time.
Undertake a systemic evaluation of the barriers to improvement in each market segment and develop policies to address these barriers.	Identification of major obstacles and potential solutions.
Address energy poverty by improving the energy efficiency of the building stock.	Improving the energy performance of multifamily residential buildings will help improve living standards of vast groups of the national population. The large-scale renovation of multifamily residential buildings which is now on-going under the National programme for the improvement of energy efficiency of multifamily residential buildings will continue by an update of the Programme whereby the grant component is reduced and various sources and

Policy	Potential application
	financing mechanisms are included.
Setup a broad group of stakeholders as a forum for consolation, policy making and feedback on practical matters and barriers to renovation.	The stakeholders identified in this document can form the basis for setting up a stakeholder forum.
Demonstrate leadership by stepping comprehensive renovation of public buildings, thereby increasing awareness and capacity so that renovation moves forward on the wheels of private commercial initiatives.	In addition to the mandatory 3 % renovation rate (Article 5 of Directive 2012/27/EU) and with a view to supporting the achievement of the national energy efficiency target in all State-owned heated/cooled buildings used by central government, Bulgaria has committed to improve each year the energy performance of at least 5 % of the overall GFA (Article 23 of the ZEE).

Table 4.11-2: Legislative and regulatory polices/measures and their potential application in Bulgaria

Policy	Potential application
Identify potential accelerating factors and develop appropriate regulations which can contribute to improving the energy performance of buildings.	Improvement of the legal basis: Condominium buildings management policies (Condominium Management Act, ZUES), including incentives for entrusting building management to legal entities, strengthening the requirements to owners of vacant apartments, introduction of penalties for owners who fail to comply with decisions of the general meetings, etc. Social assistance policies: introduction of measures to encourage participation of low-income owners in renovation programmes (through the heating allowances mechanism), etc. Encourage the implementation of local policies supporting the renovation of multifamily residential buildings. Provide more flexible opportunities to support the implementation of building renovation programmes.
Raise the level of energy efficiency requirements in order to encourage comprehensive renovation.	Should be treated as a priority after 2018.
Reassess certain restrictive practices which hurdle the local deployment of low or zero carbon technology with a view to creating a favourable environment for buildings which integrate renewable sources.	Active support for integrated renewable sources without prejudice to EU State aid rules.

Table 4.11-3: Technical polices/measures and their potential application in Bulgaria

Policy	Potential application

Policy	Potential application
Assess the potential of centralised heating systems as sources of efficient low carbon energy.	Measures to improve efficiency and public approval in order to counter massive withdrawal (opt out) of consumers from strict heating services. Introduce concrete support measures through the National programme for the energy efficiency of multifamily residential buildings.
Ensure appropriate monitoring of and compliance with construction standards.	In accordance with the EPBD.
Develop standardised solution packages easily applicable in similar types of buildings.	Create a database of technical solutions to serve as basis for future projects/investments. Consider development by municipal authorities of model designs for buildings constructed by industrial methods, based on the example of Sofia Municipality.

Table 4.11-4: Financial polices/measures and their potential application in Bulgaria

Policy	Potential application
Provide access to financing sources, including international financing together with effective mechanisms for the mobilisation of private capital.	Consider potential optimisation by redeployment of funding from national and international sources.
Develop a range of financing mechanisms and arrangements tailored to individual market segments and providing simplified (single window) and commercially attractive access to funding for comprehensive renovation.	There is a major need for a financial mechanism which supports the renovation of multifamily residential buildings by a combination of grants, simplified borrowing and support targeting financially disadvantaged owners.
Develop mechanisms to encourage comprehensive renovation on financing provided by third parties such as ESCO.	Review and where appropriate improve the legal basis to ensure efficient ESCO contracting for energy efficiency of public buildings.
Consider potential incentives (such as preferential tax treatment of energy-efficient buildings and dissuasive treatment of low-efficiency buildings).	Bulgarian law to afford tax preferences for buildings in which energy saving measures have been applied.

Table 4.11-5: Information, communication and capacity building polices/measures and their potential application in Bulgaria

Policy	Potential application
Set up a public database of energy performance of renovated buildings and of available methods for comprehensive renovation.	Insight of various renovation solutions will encourage the reuse of these solutions.
Accelerate the introduction of training programmes targeting key professions and vocations.	Link school and university curricula to advanced trends and practices in the area of energy efficiency.
Create knowledge/experience sharing networks among	Understanding how other Member States address

Policy	Potential application
regions/Member States.	specific issues may help address similar issues in Bulgaria.
Promote the clustering of related manufacturing processes to maximise macroeconomic benefits and minimise inherent CO_2 emissions.	Increase enterprise awareness of existing financial opportunities.
Develop and disseminate information and advertisements to sensitise building owners by making them aware of the opportunities for comprehensive renovation.	The success of any policy depends on the effective involvement of owners of the two major types of buildings, residential and non-residential. Conduct of information and communication events is a horizontal objective and a permanent activity in all national initiatives.

Table 4.11-6: R&D polices/measures and their potential application in Bulgaria

Policy	Potential application
Support R&D activities and projects demonstrating the application of new or improved technology for comprehensive renovation, including reuse of best practices.	Monitor on a regular basis existing R&D initiatives in the EU and consider options for their application in Bulgaria. Bulgaria's participation in the Union's Horizon 2020 programme should be promoted.

The next table complements the overview of individual policies/measures and their potential application in Bulgarian circumstances by outlining specific issues and measures to address them:

Table 4.11-7: Specific issues and measures to address them

Issue	***Measure***
Lack of sufficient and verifiable information on the building stock.	Fill the blanks in the national database and deploy a sustainable system for capturing snapshots of the existing building stock across the various categories of buildings.
Mixed social profiles of occupants of multifamily buildings, including households affected by energy poverty and unable to contribute to the funding of energy saving measures in the building.	Strengthen support polices and measures targeting households affected by energy poverty: - extend the support so as to include low-income individuals and households; - design support schemes (based on national and local sources) targeting household contribution to building renovation projects.
There is a need to optimise and accelerate the implementation of energy efficiency programmes in the residential sector.	Intermediate and ex-post assessments of existing energy efficiency programmes in the residential sector to help identify and dismantle barriers. Gauge how apartment owners in condominium building perceive the programmes.
The lack of traditions and experience in the management of condominium buildings is a major challenge to creating appropriate organisation for energy-efficient renovation of entire multifamily buildings. Bad practices, including uncontrolled and inefficient piecemeal interventions in building envelopes, have become widespread over the years. These created stubborn and persistent misconceptions which undermine efforts to deploy a large-scale process aimed at the renovation and EE improvement of multifamily residential buildings.	Improve the legal framework (ZUES) on the basis of the lessons learned from the implementation of existing EE programmes and schemes. Raise public awareness of: - obligations of the owners of apartments in condominium buildings; - benefits of comprehensive renovation as opposed to fragmented measures.

4.12 From grants to financial mechanisms for the financing of residential energy efficiency

Grants schemes are often the only means to demonstrate impacts and undeniable results, and build a critical mass so that the process can continue on borrowed funding. The transition to borrowing arrangements is inevitable due to the widely recognised downsides of grant financing:

- grants are typically insufficient (because public budgets have their limitations);
- the measures applied are often only part of all measures that can be applied to achieve maximum impact;
- grants are provided post-factum in reimbursement of the expenditure made. Owners therefore need to pay the expenses upfront; however, for many of them this is unfeasible.

This backdrop puts forward innovative revolving solutions which come to displace grant schemes. The main advantages of the new financing schemes are:

- ✓ the financial resources can be reused and still remain owned by the State;
- ✓ loans are widely used for property acquisition or renovation in the housing sector;
- ✓ these mechanisms are more easily manageable by the government administration.

European experience has now demonstrated that the most successful mechanisms are based on an integrated approach which combines three components: (1) simplified access to borrowing, (2) grant aid and (3) financial aid targeting low-income households.

Loans are typically provided for a long term (up to 20 years), under low interest rates (3 % or less), and are intended for full (comprehensive) renovation, because:

- comprehensive renovation is expensive;
- this is the only kind of renovation capable to generate sufficient savings so that business cases can be made to convince banks and financiers approve the loans;
- impacts are long-term and thus justify longer repayment periods. Consequently, the monthly instalments due by owners would be low meaning that these loans will be affordable for the majority of households.

According to usual practice in Member States, loans are provided to Associations of Owners (AOs). A common problem is that AOs do not possess assets which can secure the loan; however, this problem can be addressed by solutions in various combinations such as State guarantees which do not exempt AOs from the obligation to provide general security to the financing institution for risk sharing purposes.

Loan schemes typically take into account the average financial standing of potential borrowers. Financing mechanisms should also recognise the fact that the social and financial status of individual apartment owners in a condominium building can be very diverse. Several approaches can be used to address the issue of low-income households that cannot afford any form of investment in renovation:

- the level of the grant component can vary according to income levels;

- providing financial aid specifically intended to support the participation of financially disadvantaged owners;
- the monthly instalments due by financially disadvantaged owners can be paid by the State or local authorities.

The structural funds support renovation by grant schemes or lending mechanisms, or by combinations of the two. The fusion of grant and borrowing arrangements becomes necessary because public resources are limited and cannot meet all EE investment requirements. On the other side, without support from grant schemes, loans alone would not solve the financial handicaps of many owners or the long time to breakpoint of investments in energy saving measures when applied as a full package and at once.

Bulgaria's journey to large-scale renovation of multifamily residential buildings is at its earliest phases. The approach at the start of the journey was to use 100 % grant financing until the allocated EU and national resources are used up. Renovation of a critical mass of buildings across all cities and municipalities is expected to raise citizens' awareness of the benefits brought about by energy efficiency, and reverse owners' attitudes and resistances. This will drive up interest and motivation to invest in the comprehensive renovation of residential buildings.

In the meantime, efforts will be made to dismantle barriers and create a sustainable financial mechanism by combining grant financing with simplified access to borrowing for energy-efficient renovation of multifamily residential buildings.

The National programme for the energy efficiency of multifamily residential buildings is an example of this approach. Essentially the Programme is the first phase of the journey towards a broader process of residential buildings renovation. The Programme embarked on the journey with 100 % grant component in 2015 and 2016. At the next phase of the implementation of energy efficiency measures in the residential sector, the Programme will be steered along the lines of combining the grant component with simplified access to borrowing at low interest rates (in the range of 3–4 %). Part of the next phase of the Programme is the design of a financing mechanism whereby low-interest loans are secured by State guarantees.

The grant component of the Programme will be reduced stepwise until 2020 to 75 %, 50 % and 25 %. This approach should include a social mechanism for financially disadvantaged apartment owners whereby they should be eligible for 100 % or 90 % grants on the basis of specified social criteria.

It should be noted that the combined approach was applied already in the programming 2007–2013 under certain schemes of OP 'Development of the Competitiveness of the Bulgarian Economy' and OP 'Regional Development' (although not exclusively in the area of EE improvement of the building stock). This means that a certain level of capacity exists in Bulgaria. This applies both to the authorities which manage public/ESFI money and to lenders (banks and financial institutions).

Stepwise reduction of the grant component should be combined with stepwise introduction of appropriate tax preferences/incentives such as low-interest loans whereby money is given upfront to owners/AOs and repaid in accordance with an agreed repayment plan and with a set of guarantees which provide assurance to the lenders (banks) that they will receive back all or part of their capital in case a borrower defaults on their obligations.

Table 4.12-1: Benefits of grant schemes for the various stakeholders

Stakeholders	***Benefits***
The State	Pursue the objectives of the programme, namely reduction of GHG emission, by stepping up money supply
	Reuse of the money repaid
	Combine grants with financial mechanisms
	Encourage public-private co-investment thereby leveraging the resources available for GHG reduction
	Support market-based supply of money to GHG reduction initiatives by capacity building across the financial community and by securing additional capital
Banks	Diversify/expand product portfolios and activities
	Access to technical assistance and training on how to market the new products
	Share risks with the public sector
	The additional resources support the development of products for new markets or for entering previously unfeasible markets
Associations of owners	Access to preferential financing otherwise inaccessible
	Obtain funding from local banks under procedures more simple than those for standard bank loans
	The loans obtained are packaged with technical assistance and advice
	Repayment instalments made affordable owing to longer loan repayment periods

4.4 Key aspects of long-term development by 2050

In the longer period 2020–2050, Bulgaria will investigate and identify mechanisms which ensure the achievement of Union and national energy efficiency targets in the building sector by 2050 and interim targets by 2020.

This will be supported by activities and concrete steps for the analysis, evaluation and structuring of effective financing mechanisms which encourage private actors and home owners invest their own resources rather than rely on grant schemes.

These mechanisms should be based on a concrete assessment which includes at least the existing regulatory requirements (in so far as standards for the next period 2020–2050 are not available at present):

- ✓ definition of the most appropriate financial tools;
- ✓ identification of market inefficiencies or suboptimal investment situations;
- ✓ estimation of the level and scope of the public investments required;
- ✓ define the estimated rate of private co-financing for energy efficiency measures where grant schemes are combined with support from the private sector;
- ✓ options to afford preferential rewards to private or public entities operating as arms-length investors in a market economy;
- ✓ identification of any State aid elements in the meaning of Union and national law wherein any State aid

present should be limited to the amount strictly necessary to compensate the lack of private capital, having regard to market inefficiencies or suboptimal investment situations.

Additional mechanisms to encourage private investment and transition from grant schemes to other financing arrangements may include a series of tools and policies designed to change behaviours by fiscal incentives. Any introduction of fiscal stimuli should be based on an analysis and assessment by the Ministry of Finance of the implications of these stimuli on revenues streams to the national budget. In the longer term, efforts will be made to design concrete fiscal incentives or combinations of incentives which encourage private investment in improving the energy efficiency of building stock.

All competent institutions will contribute, within their respective remits, to the planning of sustainable models for the encouragement of private investment. These will include relevant government ministries/agencies, managing authorities of operational programmes which support energy efficiency measures, and local authorities.

In the longer timeframe 2020–2050, identification of additional mechanisms to attract private investment in energy efficiency will be supported by the identification and assessment of practices existing in Member States. This will be based on an assessment of the applicability of each practice in Bulgaria to obtain assurance that arrangements (or their variations) which are functioning and efficient in another Member State will be equally successful when applied in Bulgaria. The introduction of any mechanism will require the commitment of technical, human and financial resources such that the costs of these resources do not exceed the benefits/savings achieved thereby. The State should therefore arrange for ex-ante assessments to ensure that a particular practice will be successful.

Bulgaria will also endeavour to introduce social policies targeting financially disadvantaged owners as part of the forward-looking objectives. In collaboration with the national institutions responsible for social policies, an analysis will be made of the options to apply full (comprehensive) renovation of condominium buildings in which financially disadvantaged apartment owners are present. This will again include an estimation of the level and impact of the public resources that Bulgaria needs to invest, from two perspectives: the investments required to set up concrete support schemes and the implications for the national budget relative to the savings expected.

5. ESTIMATING THE EXPECTED ENERGY SAVINGS

5.1 Direct benefits: energy-saving and environmental impacts

The three tables underneath provide a consolidated view of the impacts of the scenarios considered by 2020 for State-owned, municipal and residential buildings, respectively. The contribution of projected savings in State-owned and municipal buildings is determined against the national target excluding the obligated parties referred to in Article 14(4) ZEE, while the contribution of residential buildings is determined on the basis of the overall national target.

Table 5.1-1 Projected savings in each scenario by 2020, State-owned buildings

Indicative scenario	HEADLINE PROJECTIONS 2020					
			Savings (FEC and emissions)			
	Renovated GFA, m^2	Investments, BGN	ktoe	GWh	Contribution to the national target, %	t co_2
Scenario A1	526 904	79 035 547	12.77	148.54	5.55%	18 039.83
Scenario A2	582 294	87 344 040	13.61	158.22	5.92%	19 215.69
Scenario B1	953 820	143 073 031	24.01	279.19	10.44%	33 907.31
Scenario B2	1 164 587	174 688 079	27.21	316.45	11.83%	38 431.38
Scenario C1	708 795	106 319 229	17.44	202.83	7.58%	24 632.93
Scenario C2	815 211	122 281 655	19.05	221.51	8.28%	26 901.96

Table 5.1-2 Projected savings in each scenario by 2020, municipal buildings

Indicative scenario	HEADLINE PROJECTIONS 2020					
			Savings (FEC and emissions)			
	Renovated GFA, m^2	Investments, BGN	ktoe	GWh	Contribution to the national target, %	t co_2
Scenario A1	1 208 340	181 250 927	29.30	340.65	12.74%	41 370.45
Scenario A2	1 335 364	200 304 657	31.20	362.85	13.57%	44 067.02
Scenario B1	2 187 380	328 107 040	55.06	640.27	23.94%	77 759.07
Scenario B2	2 670 729	400 609 314	62.41	725.70	27.13%	88 134.05
Scenario C1	1 625 468	243 820 147	40.00	465.14	17.39%	56 490.29
Scenario C2	1 869 510	280 426 520	43.69	507.99	18.99%	61 693.83

Table 5.1-3 Projected savings in each scenario by 2020, residential buildings

Indicative scenario	HEADLINE PROJECTIONS 2020					
			Savings (FEC and emissions)			
	Renovated GFA, m^2	Investments, BGN	ktoe	GWh	Contribution to the national target, %	t co_2
Scenario A1	8 040 397	1 206 059 617	230.32	2 678.20	32.17%	311 673.63
Scenario A2	11 643 262	1 746 489 225	283.94	3 301.65	39.66%	384 227.63
Scenario B1	16 948 746	2 542 311 888	417.87	4 859.04	58.36%	565 467.36
Scenario B2	17 464 892	2 619 733 838	425.91	4 952.48	59.48%	576 341.44
Scenario C1	27 688 679	4 153 301 807	687.70	7 996.61	96.05%	930 599.08
Scenario C2	29 108 154	4 366 223 063	709.85	8 254.14	99.14%	960 569.07

On the basis of the analysis above, the scenario to be implemented in 2016–2020 is Scenario A2 with a contribution to the national energy saving target of 39.66 %.

5.2 Other indirect benefits

Implementation of the National long-term for the promotion of investments in measures aimed at improving the energy performance of the national stock of public and private residential and commercial buildings will contribute to:

- raising citizens' social status and quality of life;
- strengthening public trust in institutions;
- improving the regulatory framework;
- improving the investment environment;
- development of technologies and of the free market for goods and services;
- job creation;
- strengthening the administrative capacity of central and local government and improving the interoperability of the functions and responsibilities exercised by the institutions involved;
- improving Bulgaria's image in the EU as a reliable partner in the implementation of the Union's sustainable development policies.